Success Factors in Interactive Design

Defining key success factors within interactive design.

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Abstract

This research explores the factors that contribute to success in interactive design in contrast to the traditional design process. The paper explores creativity within Design, and how successful collaboration works in an interactive design context. The five stages of creativity are introduced, followed by a discussion about creating with an open mind “when you're open to what's possible, you get something new - that's creativity” (Alda, 2016).

Then the study explores the design process by discussing three process models and their uses, particularly their relevance to interactive design. This section also looks at chaos within creating and describing chaos as a tool for designers to escape the normal way of approaching problems.

Next, the thesis looks at the art of collaboration in regard to an interactive project and discusses the importance of structure when intending to collaborate within a team. This section examines models for successful collaboration.

In Chapter Two, existing interactive projects are reviewed and summarised in the form of case studies. In Chapter Three, a practice led research methodology discusses how success factors are explored during the production of nine publicly exhibited interactive projects.

The research concludes with success factors for interactive design projects in the form of a tentative new model.

As you go the way of life,

you will see a great chasm.

JUMP!

It is not as wide as you think.

Advice given to a young Native American at the time of his initiation.
(Told by Joseph Campbell)

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Chapter One

1.1 Introduction

This chapter introduces research which explores the factors that contribute to success in interactive design. This chapter outlines the background and states the reason for this research, the research questions, intended audience, and the research structure that the study will follow.

1.2 Background

The definition of success is something that has been discussed for centuries, how is one supposed to define success? Moreover, how can one judge another on success? In the creative industry, the line is blurred more. In Art, some may say that success is a personal thing that cannot be measured, and it is a judgement from the artist based on the overall vision they have towards the piece they created. In life, success is based on what that person wanted at the end of their venture, if they wanted money, and became rich; then they are successful based on their original goals, correct? In design, the direction is crucial to set constraints to follow. These constraints are what can be used to measure success when designing or creating anything.

This world we live in today is one that is reliant on technology to function fully. People are forever relying on it to go about their everyday lives, as well as tasks which derive from them. As designers, we are presented with problems, finding solutions for them that seem impossible to solve. Creating visually appealing solutions that have meaning within the design. Until this technological age was born, Graphic design could be placed in a nutshell, and easily defined as more or

less a static solution, or one that is tactile in its final output. As technology has grown, this new generation has a more 'I want it now' approach to the world. This derives from the technology being so easily accessible. This technology is improving every day, which has allowed art, design, and technology to merge into a more combined discipline. Interactive design has always existed in one form or the other, whether it was in the form of sculptures, interactive art, moving images, they all have elements that now inspire designers in this day and age. No longer are creatives restricted to a certain medium to design for, and when we say 'create', the possibilities are endless. This generation is born into technology that surrounds them; the 'touch' function is something that is second nature to most children, this is the power of this technology.

> "How do creative geniuses come up with great ideas? They work and edit and rewrite and retry and pull out their genius through sheer force of will and perseverance. They earn the chance to be lucky because they keep showing up […] No single act will uncover more creative powers than forcing yourself to create consistently" (Entrepreneur, 2014).

How do we take advantage of this growing industry? Now that designs identity has been torn apart from technology, the possibilities are endless, what does that mean about the new age of designers that will emerge? The importance of them is more than ever; they will be the designers who were born with the technology in their hands. There will be scope for innovation and future technology that will make a serious impact on the world. Now, more than ever, designers have more choice in how to approach a problem, and the fast-moving world is forcing companies to think different about how they approach a problem. Interactive design works are becoming more common in corporate environments, not only the experimental art scene, as there is an opportunity to show products, brands and experiences in a more immersive way. There is potential to take brands to another level; they are no longer this entity that is just observed, the user is now part of it, each experience may be a unique experience to each individual. This

immersion allows the brand to get into the user's mind more than they ever could before. It also solidifies the importance of design and attention to detail, to ensure a successful portrayal of a brand.

> “Openness is about ‘valuing information,’ he says. 'People with high openness show high dopamine projections at the potential of acquiring information.’ In other words, the higher you score on the 'openness’ trait, the better it feels to learn new things.”

This new age of design has designers looking at a new way to tackle problems, with the ability to stare away from the status quo. This new way of approaching design has some other methods that take a typical brief and turns it into something that is unique and appealing to the modern age. Generative design and meta-design is a method of designing using algorithms, which create numerous concepts based on the parameters the designer sets. Meta-design is taking a lot of the labour out of the designing, although all the design decisions are still made by the designer. Allowing the designer to focus on what is important, also means that the project is easily scaled larger, with the baseline created when making these basic algorithms. Generative design, however, is similar to the meta-design model but used more as an art and decorative piece, where self-expression is still evident. The piece can be manipulated and transformed using code, and also created into a design installation. With new possibilities in new ways of creating, how do design methods change? Moreover, what success factors are important to take into consideration while designing these types of graphics. The new age of designers are free spirited in the way in which they approach a design problem, So with this growth and change, does the original design model still apply?

From Day one, design has always had a more structured approach compared to art, mainly because designers are creating mostly for a client, although some expression is present, the relevance to the client is the most important thing. As a

designer, you are taught steps to create, sometimes a very linear approach is used. However, why? The original model of creativity within design was: Research, concept, development, solution. This linear approach can work well, although outcomes of this process are almost guaranteed to be less creative than if more freedom was given to the creative process.

For high pressure and high paced design roles, this structure is the only way to meet deadlines, as well as to develop work to a certain quality. For most work it is not practical to allow the time to experiment and mull over ideas. However experimentation can pull the smallest idea into something creative and with deeper meaning that one cannot experience when design is rushed. Experimentation within the process of digital installations and design is key to success. As the technology surrounds us, it is easy to dive into and become lost in the technology: this idea of chaos with the design process is one that many designers find themselves in. The journey of being lost in creativity might be the journey that is needed to find that extra ‘wow’ factor within your design.

Structure is still very important, however the key points to think about is to look at the structure in a different light. Perhaps through the means of a milestone structure that would encourage more freedom, you would be able to create your own structure and goals during the project. This allows the individual to give themselves time to create chaos before they make sense of their creativity. It is important to allow an element of adventure in creativity. Otherwise the product of the creativity will only be as good as the next person, a me-too product, or solution. With this vast exposure of technology, it gives creatives a great platform to explore new ways of creating. The idea of learning by doing is one that can be practiced well in this environment. This experimentation is crucial for creatives to

allow themselves the freedom to stare away from the status quo and to explore and create.

1.3 Motivation

Within the ever changing world of technology and design, there is a need for designers that can see the possibilities that this technology represents and its creative potential. The way designers operate is changing, and the type of medium in which designers can create in is getting broader every day. With this growth in technology, there is a need for growth in the way in which designer's approach problems. Success factors in interactive design are explored to give some light on the differences in approaching this new age of design.

1.4 Research Question

Defining success factors within Interactive design.

This research explores the factors that contribute to success in interactive design. In contrast to the traditional ways of creating, how does the new design era differ to the old methods of creating, and what changes need to be made in order to make the most of this new era of design.

Q. What key factors are there to gain success in an interactive project?

Term definition

Interactive Design is defined as a user-oriented field of study that focuses on meaningful communication of media through cyclical and collaborative processes between people and technology. (Graham, 1998). For the purposes of this research, interactive design will explore interactives that go beyond mouse and

keyboard input, typically the user is not seated, the screens are projected or large and the interactive artefact is designed with a particular audience, space and events in mind.

In approaching this question the following areas will be explored.

Q. How is creativity defined?

Q. How can the design process be refined and changed to work in the modern design world we live in today?

Q. How can the success factors in Interactive design be clearly shown in an informative and effective way?

What is covered?

In this study, Interactive design is defined and compared to traditional graphic design, the creative process is looked at and critiqued.

Success in design is looked at in regard to how to define success in design.

Creativity is discussed as a broad term, then narrowed down to describing creativity within design, and its relevance towards interactive design.

The design process is thoroughly looked at, and comparisons of different design models are made to create grounds for discussion for the potential design process that is most suited towards interactive design.

Chaos within design is covered as a minor subject within the design process, discussing the importance of looking further in the creative process in order to find your creative genius.

The importance of Collaboration is covered, in regard to interactive design, and correct structure is discussed when collaborating in a creative group.
Case studies are used to reflect and evaluate real-life design projects created by the Researcher in chapter 3, as well as projects evaluated in chapter 2 from external sources.

1.5 Intended Audience

The intended audience for this study would be Creatives aged 15 to 30 with a desire to explore creatively, and to push envelope with interactive design. This study is created for the future of graphic design with the hope that students will realise that the boundaries in design are getting wider and wider each day.

1.6 Research Structure

Chapter 2

This chapter explores stages within the design process. Firstly, creativity and success are discussed in design. It looks at different definitions of success, covering the five stages of creativity. The section also looks at and discusses modes of interaction in design. The chapter then explores the different approaches to the design process, with a discussion to the relevance of each model shown, as well as a discussion in regard to introducing chaos within design, and the benefits this may show. The chapter then looks into Collaboration in regard to how to successfully collaborate in a group during the design process.

Finally, case studies are examined and success factors are discussed in reference to the specific projects chosen. This chapter sets the framework for the ability to answer the research question, and create a potential solution to the problem discussed.

Chapter 3

This chapter explorers the nine projects created by the researcher in case study form, and examines them thoroughly to outline success factors within interactive design from these projects. The case studies are now more refined, and a template is created to categorize the success factors in a clear way. This gives a better understanding of why the success factors are important in interactive design.

Chapter 4

The study then goes on to further define and recommend how to approach the success factors, and then discusses each success factor in turn. It also explains the importance of these and the potential future study that could lead on from this initial research.

Chapter Two: Literature Review

Introduction

This chapter surveys the literature on success factors in interactive projects. Firstly, success is examined and defined for interactive projects. This section discusses creativity concerning how we perceive creativity in interactive design, as well as a comparison of success factors in interactive projects vs. traditional design projects.

The chapter then moves on to discuss the design process, with a discussion about the traditional design process and what limitations it gives interactive designers if they follow this way of designing. This section refers to how success factors in the design process can relate to interactive design. This section then discusses using the idea of chaos as a way to approach some stages in the interactive design process.

Next, the chapter explores the art of Collaboration within design, looking at the advantages and the limitations of collaboration, and discussing the relevance of collaboration within interactive projects.

The next section explores six case studies of existing interactive work and discusses the success factors within these projects, as well as methods used in creating the work, and the challenges that were presented faced.

The chapter then summarises the above topics and suggests areas of focus when exploring success factors during the practice-based projects in Chapter Three.

2.1 What is success in interactive design

This section discusses creativity and success in design. It looks at different definitions of success, covering the five stages of creativity. The section also looks at and discusses modes of interaction in design.

In a creative project, many variables come into account when trying to measure success. The definition of success often changes from project to project. Traditionally, success is defined as the degree to which project goals and expectations are met (Parfitt and Sanvido, 1993). In the commercial world, “all projects stem from the needs or objectives of a client” (Chan, Scott & Lam, 2004). Time, cost and quality are still the main ways in which success is measured within a project, however, for an interactive project, how does this differ from a more traditional design project? And why?

When designing an interactive installation, there are many factors to consider such as time, cost, clients and quality of the finished product. However, there is an extra element to consider when designing for a user to then interact with, the idea of an art or design piece that can be manipulated, changed, and affected by the user.

Katie Salen and Eric Zimmerman describe in their 2004 book ‘Rules of Play’, a Model of Interactivity with four modes of interaction, that a person might have with an interactive system. (Zimmerman and Salen, 2004) The first mode is cognitive interactivity, which occurs primarily in the mind of the user. This is the low-level dialectical interaction between a person and a system. The second mode is referred to as functional interactivity, which occurs at the mechanical, or utilitarian level. This mode includes such literal interactions as page turning and

button clicking. The third mode is explicit interactivity which is described as "participation with designed choices or procedures". The final mode is referred to as "beyond-the-object" interactivity which is a cultural form of interaction. This layered model of interactivity leads to a more sophisticated way to measure success in interactive projects because success can be judged on multiple layers.

Creativity

Creativity can be described as many different things, such as the ability to make new and novel things. Singer and Singer (1990) explain creativity to be the ability to produce varied and flexible associations, which is called divergent cognition. Lawson looks at creativity in the arts and explains it with the following "In the creative arts, including design, the whole point of the business is to create something which other people will experience and which is in some way or other original and new" (Lawson, 2006, p.145)

In design, creativity is seen as such a large aspect of a successful design project. But how can creativity be measured in creative projects? As MacKenzie states, Creativity is not just about succeeding. It is about experimenting and discovering (MacKenzie, 1998). Creativity means numerous things to different people and can be defined in any number of ways. "Creativity can also be defined at many distinct levels — cognitively, intellectually, socially, economically, spiritually, and from the finite perspective of different disciplines" (Wilson, 2016)

The biggest obstacle of creativity is avoiding the norm, and branching out to the unknown, whether it is taking that walk into the fresh air and adventuring outside to get a glimpse of the real world or trying a new experience that may trigger something in oneself creatively. Looking at things differently and approaching things in a way that differs from the normal method. This allows oneself to

discover one's creative path, or as Gordon MacKenzie states, the Creative Genius (MacKenzie, 1998). This is the difference between a Mac Operator, and a Creative. The Creative person is open to new experiences, and new ways of approaching problems. With this ever-changing technological world, creatives often forget to just 'go for a walk' or take a break, that their creative practice can be affected because of the tunnel vision that has been created.

"In essence, mind set and tunnel vision are the cage of our own making. They do not allow us to see and explore options and alternatives." (Ferlic, 2006)

A change of environment, even for the minimal amount of times can be the most crucial parts of one's creative process, although it may not seem productive at the time, it will be worth every moment. Creative influence can come from the smallest things, although there are endless amounts of available information on the internet, sometimes the only way to stare away from the everyman is to look elsewhere for inspiration. Artistic influence may be a pattern on a leaf, or the way the dog runs in the park; something might trigger the creative genius within. As discussed by well known Author Alan Alda, "If you know what you're looking for, that's all you'll get - what's previously known. But when you're open to what's possible, you get something new - that's creativity (Alder,2016) This form of influence does not come as naturally when scrolling the internet, after a while, everything looks the same. Bryan Lawson discusses this issue in his book 'How designers think' (2006), he discusses the relevance of the extent to which designers are exposed to existing methods and designs while learning their craft. One school may suggest that a more free and open approach is necessary to encourage free expression. While other schools may argue that designers have to solve real life problems, therefore the need for them to be aware of existing work is valid. There is evidence on the side of the open, free and expressive

approach to design, and to put it simply, “once we have seen something done in a certain way, or done it ourselves, this experience tends to reinforce the idea in our minds and may block out other alternatives.”(Lawson, 2006, p.155) This is an interesting theory, which is see evident in the 21st century with design trends being a large influence for some designer.

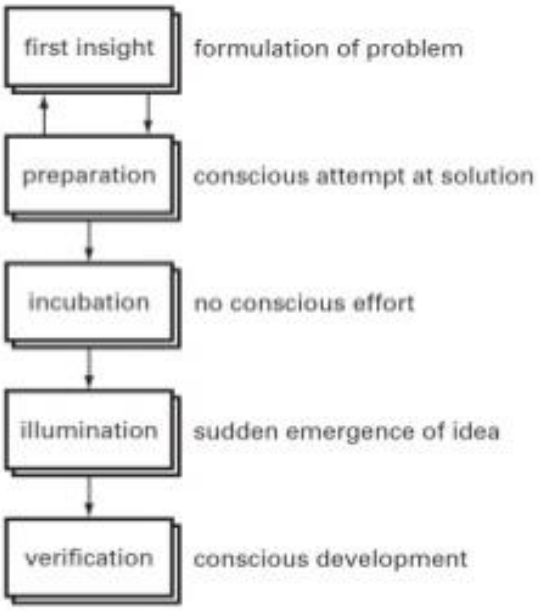

Figure 1 The five stages of creativity

Creativity is traditionally put into five stages: insight, preparation, incubation, illumination and verification.

This basic step-by-step model has been popular throughout the years as a backbone for creative thinkers. The first step ‘Insight’ encourages to realise a problem that exists and commit to creating the solution to this problem. Step two, ‘preparation’ consists of simply finding a concept for a solution to the problem, it is quite common to go to step one and two to refine the problem and the related

solution. Step three is “incubation”, where everything that has been gathered and created in the previous stages come together for the creative to then put aside and thinks about in the back of their mind, this incubation stage is very important to master, to then move onto ‘Illumination’. This is the ‘eureka’ moment, where thoughts and ideas collide to produce an idea to the problem that was established in stage one. Once the Illumination stage is finished, then the project moves into the ‘verification’ stage, where the idea is tested, developed and refined till completion. “We must remind ourselves that in design, these phases are not as separate as this analysis suggests” (Lawson, 2006, p.150). Lawson implies that depending on the project, some stages may overlap, or the project may have to backtrack to a previous stage to make alteration before going forward.

In summary to this section, creativity is about experimenting and discovering, and the new design era that has emerged is reliant on this approach for things to develop further. It is important to understand and to engage the creative within one's self. To step out into the unknown and to discover is something that is key when wanting to create something with a difference.

2.2 The design process

As Graphic design has changed throughout the years simultaneously with technology, the basic structure of the process has stayed somewhat the same. The linear approach (sometimes referred to as the waterfall process), is effective for fast deadlines and small projects, or just a guideline for a design process. However, as designs horizons broaden, there is more scope for the process and potentially more freedom within the process, because the type of design projects may require a vast amount of experimentation to get the outcome that is needed. Some reasons for this is that interactive design tools are not commonly taught to

many designers while they are under training, so a more open source approach is needed while creating some interactives or meta-design.

This room for chaos in the design process is key to having something out the ordinary, with a point of difference. The main object in mind while creating this way is the continuation of growth and learning. The agile design process below makes more sense on interactive design processes; the mode is more thorough. However, the ability to look back at one's work and reflect, improve and critique is the important factor in this model. In contrast to the waterfall process, it gives the designer the ability to improve upon their work. The size of these steps are all dependent on the project, and the importance of each part is to that project. If the project is to create an app design, then user testing would be an important factor, however, if the project is to create an observant generative design, then user testing would be less important. Both models can be successful, however knowing when it is appropriate to apply which influences success and failure.

The Waterfall model

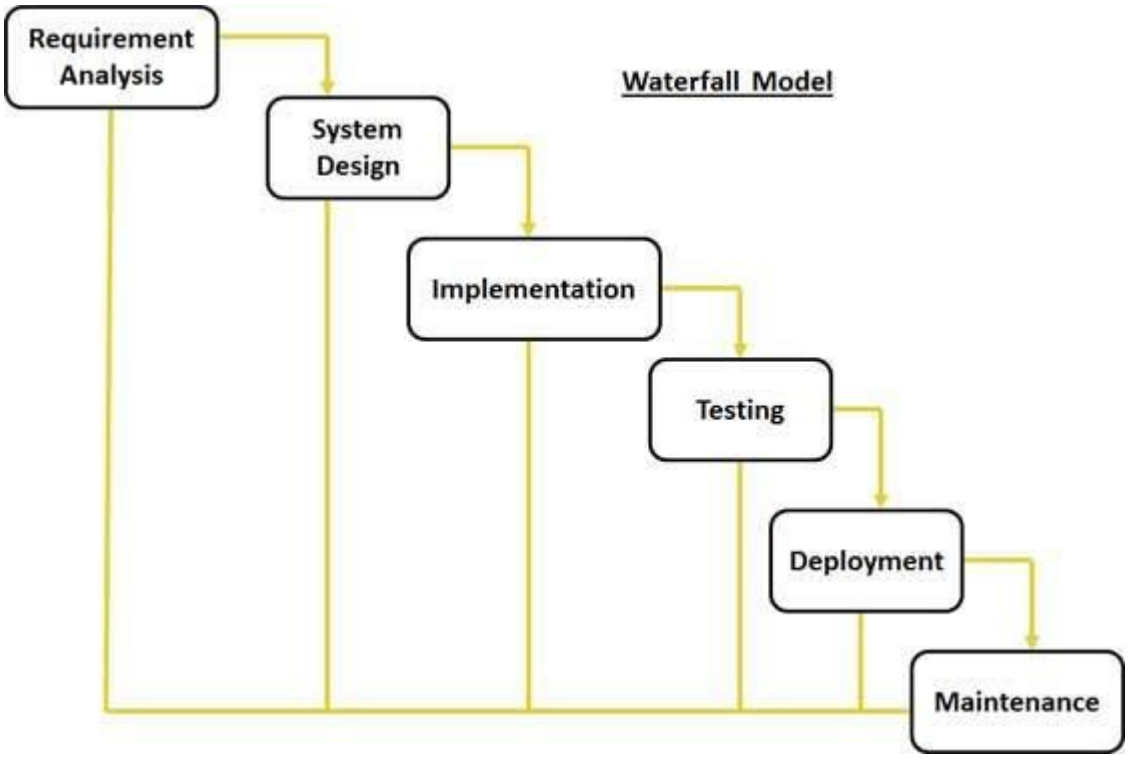

Figure 2 the waterfall design model

The waterfall model is referred to as the linear-sequential life cycle model. The process is straightforward in the way it is presented. Traditionally, this is how the design process has been viewed. Presented as a stage by stage approach, this model is used in engineering and software development to cater for more structured projects that suit stages.

“In a waterfall model, each phase must be completed before the next phase can begin and there is no overlapping in the phases.” (TutorialsPoint, 2016)

For a creative project, this can be almost impossible to use, as more often than not there is a lot of toing and froing between steps to eventually refine the design.

Listed below are some pros and cons to the waterfall technique (TutorialsPoint, 2016).

Pros

Simple and easy to understand and use

Clearly defined stages

Well understood milestones

Easy to arrange tasks

Process and results are well documented

Cons

Poor model for complex projects

Poor model for long and ongoing projects

Not suitable for the projects where requirements could change any moment

Cannot accommodate changing requirements

Adjusting scope during the life cycle can end a project

Integration is done as a "big-bang. at the very end, which does not allow identifying any technological or business bottleneck or challenges early

Iterative design model

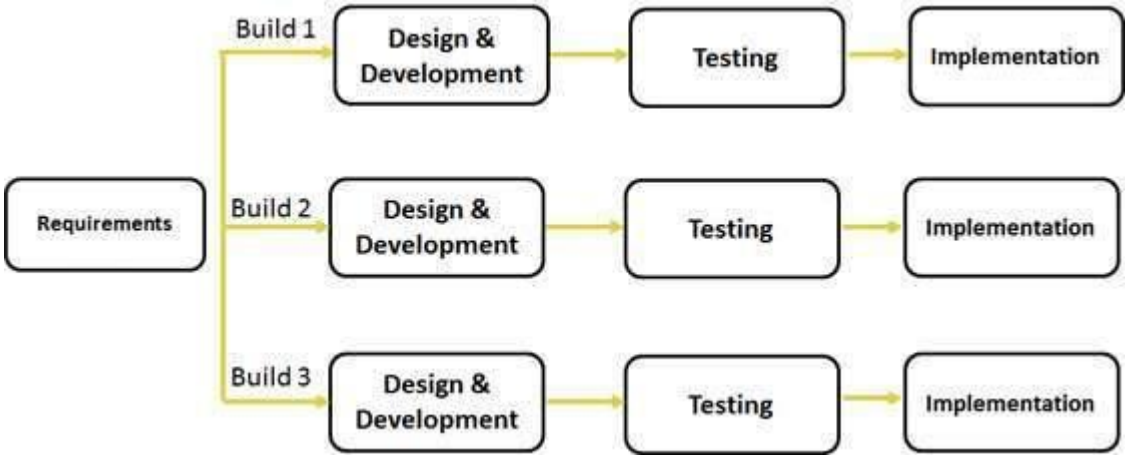

Figure 3 The iterative design model

The iterative design process starts with establishing the project's requirements and starting with an initial implementation of an idea. After creating an initial design, testing is used to find loopholes in the design created and possible improvements are recorded to improve before creating the concept in the implementation phase. These steps are repeated, making iterations of the initial concept, to either change or recreate the initial idea until the design and implementation of the designs are at a stage of refinement.

> “At each iteration, design modifications are made, and new functional capabilities are added. The basic idea behind this method is to develop a system through repeated cycles (iterative) and in smaller portions at a time (TutorialsPoint, 2016).”

This Iterative style of designing could be used for Interactive design scenarios. The way the iteration works would be a useful tool in regards to experimentation while designing interactive projects. The idea of starting small, and working from a baseline is something that is very effective in the way some designers work

while designing interactive experiences. There are still some restrictions in regards to the solid steps that the iterative model represents. Perhaps more freedom within the steps may be more suitable for an interactive design process, to ensure the freedom to create is still a strong part of the process.

The Agile model

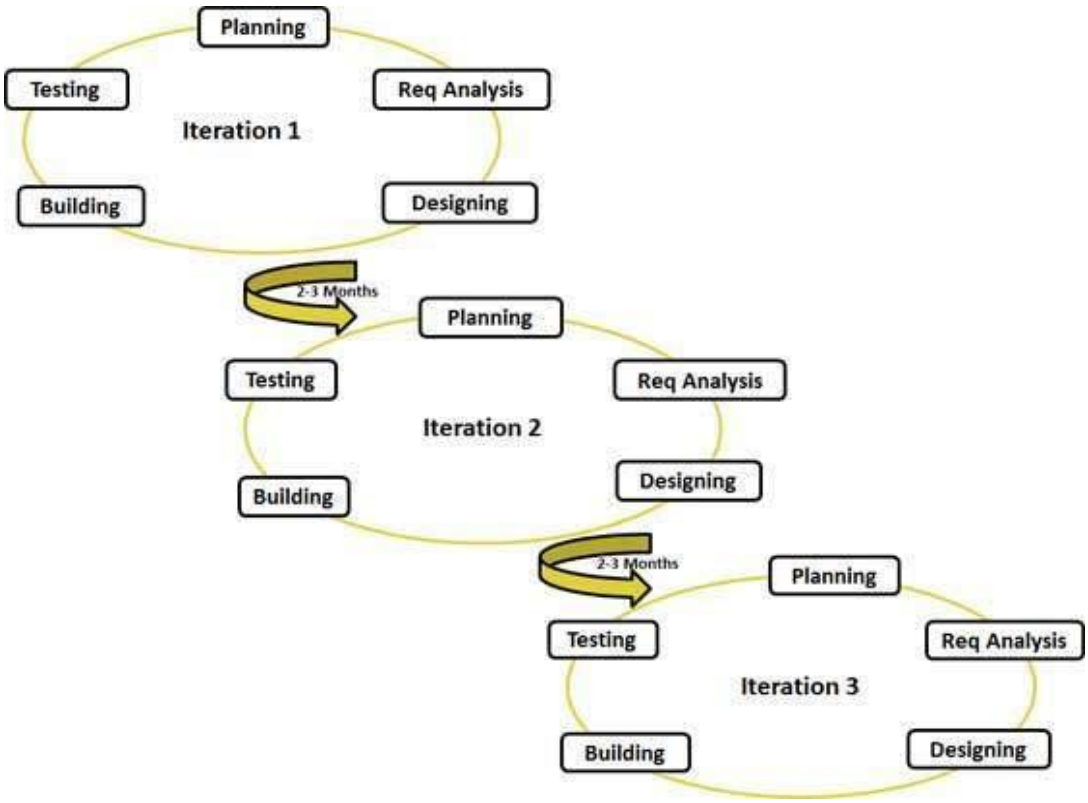

Figure 4 The Agile design model

"Agile model believes that every project needs to be handled differently and the existing methods need to be tailored to best suit the project requirements. In agile the tasks are divided into time boxes (small time frames) to deliver specific features for a release." (TutorialsPoint, 2016)

This model takes some elements of other processes and combines them, as well as introducing an element of freedom in the way the process is approached based on the project at hand.

The agile method uses an adaptive approach to the process. There is no detailed plan. However there is a clear direction, with future tasks and features planned that need to be created. This process allows the team to adapt to the change well, while requirements are changing dynamically. There are still frequent tests of the project to minimise any risk of any major failures in the future (TutorialsPoint, 2016)

Based on the findings in the above examples, there are many design processes that can be effective for many forms of design. The very traditional waterfall approach is applicable for less creative and more structured projects. However, in this new age of design, the more flexible approach to design is something that will cater to the new projects that are emerging in this interactive age. Designers need freedom to experiment, ponder, refine and work in a free reign to move forward and to advance within the process. Iterative design processes can work well with the interactive projects in regards to creating an early mockup of design, and slowly refining this into a polished outcome.

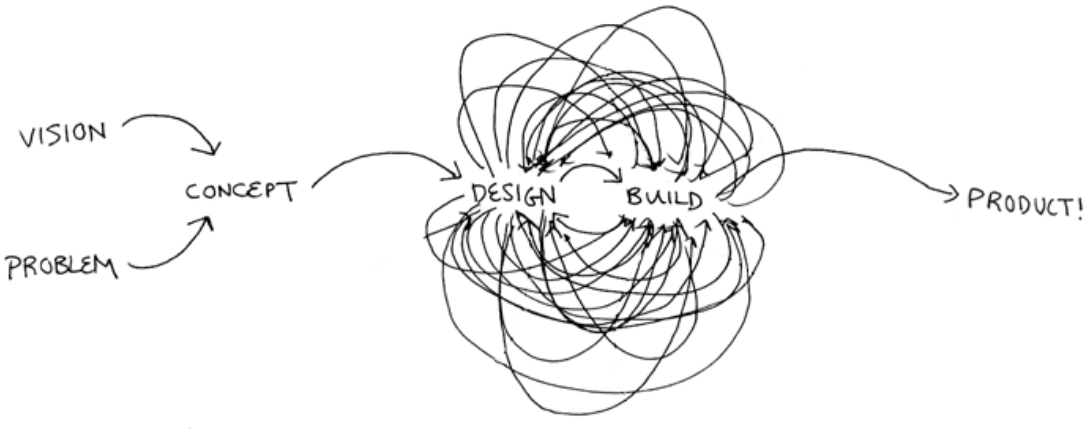

Figure 5 the common modern design process

A lot of interactive designers have a process that is more like this, based on the amount of creativity that is required to learn and design, and the amount of

experimentation. This is why the middle area is referred to as ‘Chaos’, The design models are great as guidelines, but they simply are not practical while in the heart of the design process, the designer is scrambling between ideating, building and refining, that sometimes it is easy to get lost. Being lost should be viewed as a positive thing in this realm of creativity. While being lost is normally seen as a negative, let's view it in a positive light in this regard.

The definition of chaos is “a state of utter confusion or disorder; a total lack of organisation or order.” That disorder can lead to great things. As a creative, it is important to look at the transitions between order and disorder, to get a creative outcome that has a point of difference but still makes sense. Knowing when to turn back, and re-order and structure, is a skill that is relevant for creatives to have. However it is beneficial to look at how chaos can create outcomes, and how a small decision can end up affecting the overall outcome of the project in the end. Although two concepts may start as derivatives as the same idea, this does not mean that they will have similar outcomes, nor does it mean that both of them will be successful outcomes. Even the same idea can be manipulated into many different final solutions; this alone is the advantage of experimenting with design.

How to define Chaos?

“Chaos is the science of surprises, of the nonlinear and the unpredictable. It teaches us to expect the unexpected. While most traditional science deals with supposedly predictable phenomena like gravity, electricity, or chemical reactions, Chaos Theory deals with nonlinear things that are effectively impossible to predict or control, like turbulence, weather, the stock market, our brain states, and so on. These phenomena are often described by fractal mathematics, which captures the infinite complexity of nature. Many natural objects exhibit fractal

properties, including landscapes, clouds, trees, organs, rivers, and many of the systems in which we live exhibit complex, chaotic behaviour. Recognising the chaotic, fractal nature of our world can give us new insight, power, and wisdom. For example, by understanding the complex, chaotic dynamics of the atmosphere, a balloon pilot can “steer” a balloon to the desired location. By understanding that our social systems and our economic systems are interconnected, we can hope to avoid actions which may end up being detrimental to our long-term well-being.” (Mandelbrot, 2011)

Chaos is an important tool for designers to understand, and use within their design process, so that their designs branch out from the traditional design process, and make something that works for creatively. The promotion of making mistakes as a positive thing, and not something to be frowned upon, something that can be looked at as a potential outcome, rather than a waste of time. The butterfly effect is key in generative art and design. Changing one small concept, or component, or decision can have a disproportionate effect on the overall outcome of the design or art piece.

2.3 The Art of Collaboration

As a designer in this new era of technology and design, collaboration plays a part in all projects, whether they are big or small. When collaborating with others, there are many aspects that need to be covered to make sure that the collaboration is a success. With interactive projects, it is more likely to have a group of creatives involved, than just one or two involved.

> “The heart of collaboration resides in developing a climate of trust and mutual respect. This involves identifying and honouring the different perspectives, strengths and weaknesses of all team partners.” (Hudson & Glomb, 1997)

Sebell and Goldsmith in their article “Dodging roadblocks on the innovation highway” break collaboration into four easy to follow steps to use as a fair guideline. (Sebell and Goldsmith, 1997)

Sebells and Goldsmiths preferred steps are as follows (Sebell and Goldsmith, 1997):

1. Manageable numbers

A small and effective team is best

2. Necessary and relevant expertise

All the key organisational functions are in the room.

3. Diversity and naiveté

A counterbalance to the specific expertise needed is crucial to any creative team; it might be this combination of new and old that will give the team its creative breakthrough it needs.

4. Real decision making

Recommending, and implementing responsibility

These guidelines above are very useful when thinking about starting a creative team to collaborate with. ‘Manageable numbers’ means that each team member should serve a purpose independently from each other. It is important for each member to serve an important role that complements the other team members skills. ‘Necessary and relevant expertise’ means that while ideating with the group, it is important to make sure that all the key personnel are present. This is something that is crucial to the potential success of the group. Take for example, if a group member gets a ground-breaking idea for a project, and their key UX designer is not present to mock up a concept, then that fresh idea to its full potential may be lost. ‘Diversity and naiveté’ is something that cannot be

forgotten, people often think that experience is better than new. However, in this modern world of technology, it is evident that many breakthroughs were from the 'young gun' of the team having a radical idea that sparks a phenomenon. This combination of new and old is crucial to success via diversity. The last step is called 'Real decision making'. Here Sebell and Goldsmith explain how they expand leadership into three models, Decision making (senior manager with the responsibility for the task). Decision recommending (a team player that will suggest decisions throughout the process, however, does not hold project responsibility). Decision implementing (the skilled craftsman of the group, the one who creates and experiments more than others). It is suggested that a combination of these three members in a collaborative team is a recipe for achieving breakthrough innovation, as well as playing to the strengths of each team members.

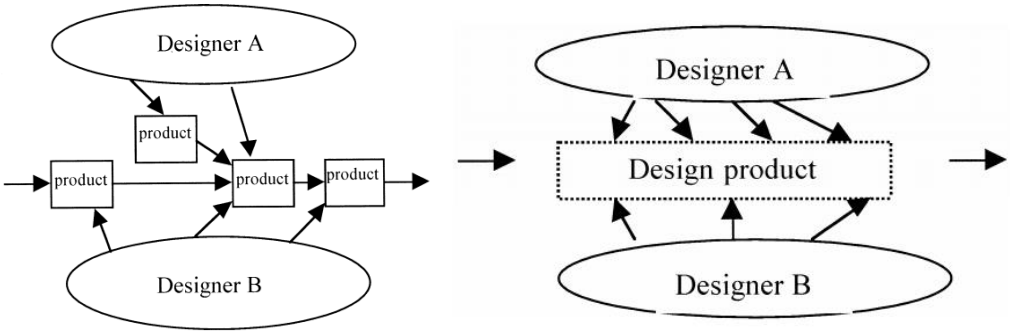

Figure 6 (a) Collaborative design model 1 **(b) Collaborative design model 2**

In the above diagrams, there are two different approaches in the way in which the designers collaborate to complete a project. In Figure 2.6a, the two designers work intensely with each other, with an intimate understanding of each other's decisions and reasoning. This method of working is not practical for most creative projects, purely because this intimate style of creation is extremely draining in regards to how long the parties can endure this type of partnership. However, figure 2.6b shows each participant having specific tasks that they are working on simultaneously to the other designer, this tends to be more effective in the long

run, especially when the project size scales to a larger project. The idea behind this model is that each member has a specific set of skills that will complement the other. Therefore the need for each designer to be together every step of the way is non-existent (Muronaga & Harada, 1999).

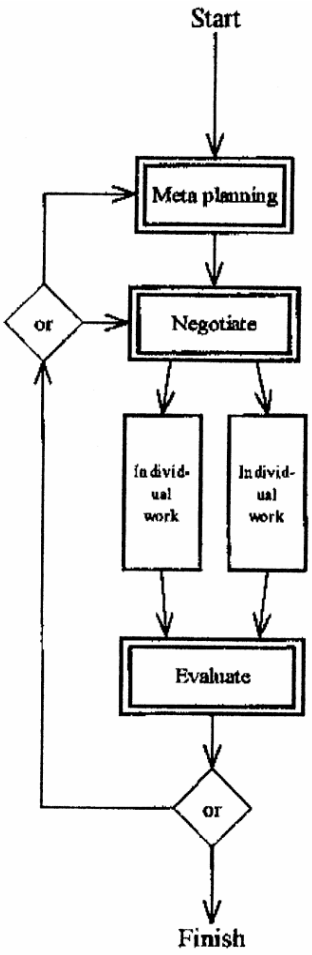

Figure 7 Collaborative design model 3

Figure 2.7 shows the collaboration process according to Gero and McNeill. The model of design collaboration shows the participants are together for moments, then divide up and go their separate ways into individual tasks based on their strengths within the group and within the project. This model also allows the designers to backtrack towards the negotiation phase and in extreme cases back to the meta-planning stage of the project. Meaning that for all the major

milestones and checkpoints, the team comes together to evaluate and critique. This makes sure that the standard of the work is high, and any individual part is not steering away from the project's overall goals were.

Collaboration is such an important part of creative work, and it is important first to understand how to structure collaboration in an effective way and understand the important factors that play a part in a successful collaboration. Although it is important to collaborate in creative projects, there are proper ways in which to structure and approach the collaboration process to avoid unwanted issues with teammates and fellow creatives.

2.4 Case Studies

During the summer, I created a small database of three hundred interactive projects, developing a set of tags for the work collected. The following case studies have used five samples from this research as examples of interactive work reviewed.

In this section, a selection of five interactive pieces was selected to be reviewed. These interactives each derived from five different sources, with a variety of different work, all with an interactive element within their designs. The main focus on with these case studies is the problem they solve, and how each project solves this and the success factors within the projects.

Case #: 27

Title: Immersion Box

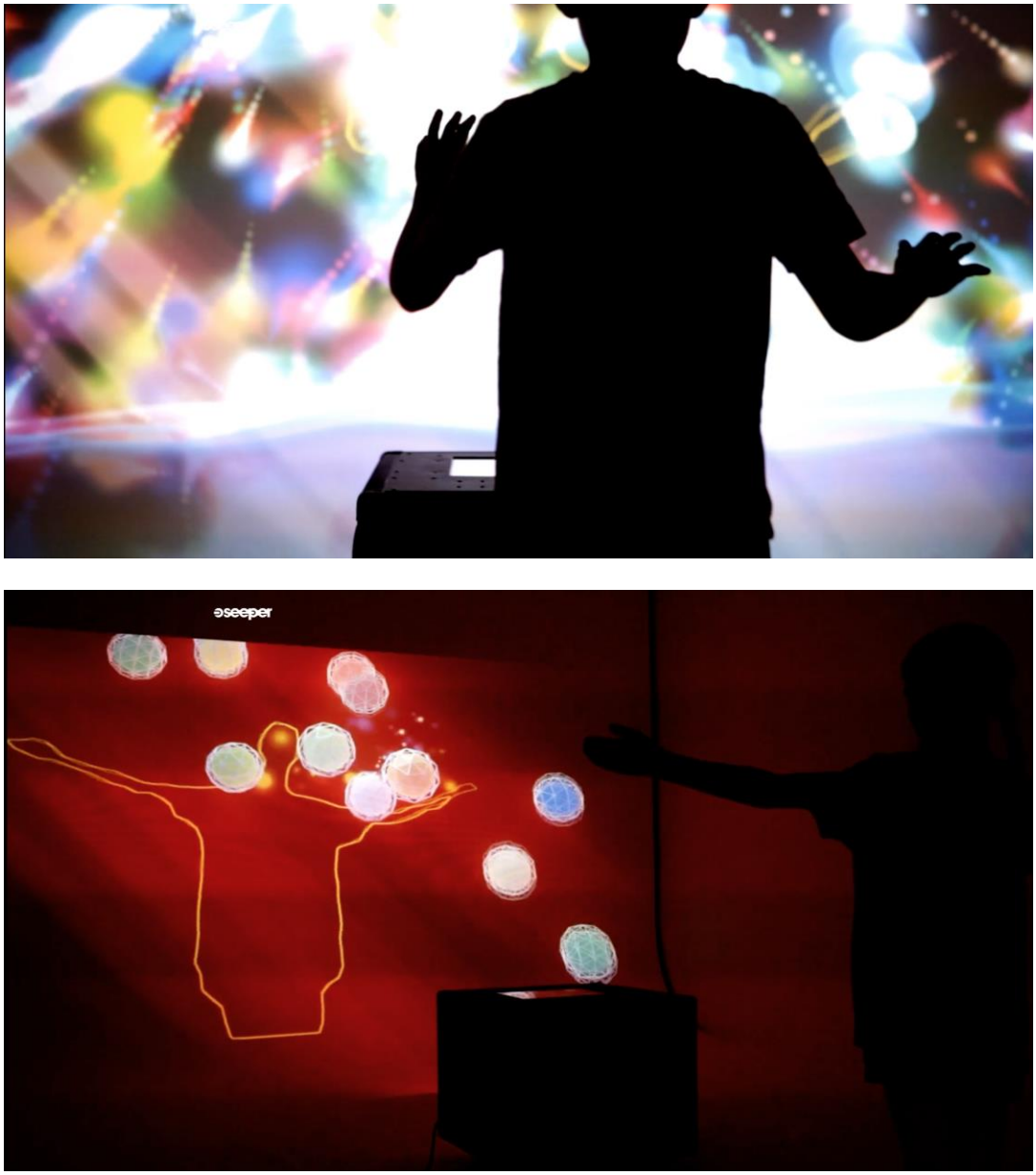

Figure 8 Immersion box

Author: Seeper (2012)

Website: http://seeper.com/work/immersionbox

Problem: With learning being the most important part of a child's upbringing, when it comes to special needs children, learning can be different, and difficult for both the teacher and the child. Baskerville School for young people with autism

saw this as an excuse to create a way for students to learn in an environment that differs from an everyday environment, to help cater to their student's needs.

Solution: Seeper created an immersive environment that students could explore and manipulate. This hands-on approach to learning cater's to a more practical audience who learn by doing; the ability to keep this audience stimulated is very important.

Designed for 8 to 25-year-olds with learning disabilities, immersion box offers a wide range of functions, including a multi-touch user interface, projector, speakers and motion capture cameras to create rich, varied, and highly personalised sensory experiences. The applications are designed to be simple and intuitive for users all ages and abilities. Particularly aimed to target some of the learning challenges associated with autistic spectrum conditions.

Immersion box encourages the user to explore and improve skills in social communication, engagement, collaboration, and in coping with and preparing for changes in their environment.

Success factors: When designing these interactives there are a few important aspects to take into consideration, here is a few that would be considered:

Tech - With the main aspect of the box being the technology that lies within, this is such a large part of the success of the project, user testing would have a been a large part of the success of the project

Space - With the immersive box being a portable interactive piece, space is something that may not always be controlled, therefore the

Clients - With the needs of the users being specifically those whose suffer from autism, the need to work with the client and fully understand the specific users is essential.

Case #: 223

Title: Future Energy

Figure 9 Future energy

Author: Potion(2013)

Website: http://www.potiondesign.com/project/future-energy/

Problem: With problems such as global warming, Pollution, and many others around the world, we have the ability to be able to create an awareness of these

issues visually for the world to see. With the development of technology, and design progressing from a static form to something that the user can manipulate, the scope for projects that combine world problems, and this technology is really growing. With the importance to raise awareness and to show their importance is strong.

Solution: Future Energy Chicago is an all-digital, immersive gaming environment that gives audiences control over the direction the world is moving, by offering students and citizens the tools for making smart decisions to save Chicago's future.

Five custom interactive stations were created where visitors compete as teams. "Each station highlights a different class of energy use, from the car, home, and neighbourhood to major infrastructure systems of transportation networks and the city's power sources. By working together, teams make informed decisions to trigger effective, far-reaching changes for their environment: for example, by becoming transportation engineers, visitors design transit hubs and public transportation options, resulting in less energy spent by cars. By becoming urban planners, visitors stack apartments on top of schools on top of storefronts, creating more efficient, walkable, mixed-use neighbourhoods. Ultimately, by taking on these personas, visitors become empowered by their understanding of energy, and inspired to be thoughtful citizens, consumers, and the next generation of energy innovators, designers and inventors."(Potion, 2013)

Success factors: When designing these interactives there are a few important aspects to take into consideration, here is a few that would be considered:

Tech - With such a large installation with many input devices, screens, projectors throughout the room, technology is vital to the success of this project.

Research - With the main aspect of this installation being a factual learning experience, prior research and accurate information from reliable sources is crucial.

Testing - The scale of the exhibition is very large. Therefore thorough testing is essential for the project to be a success and be as polished as it needs to be.

Case#: 12

Title: N Building

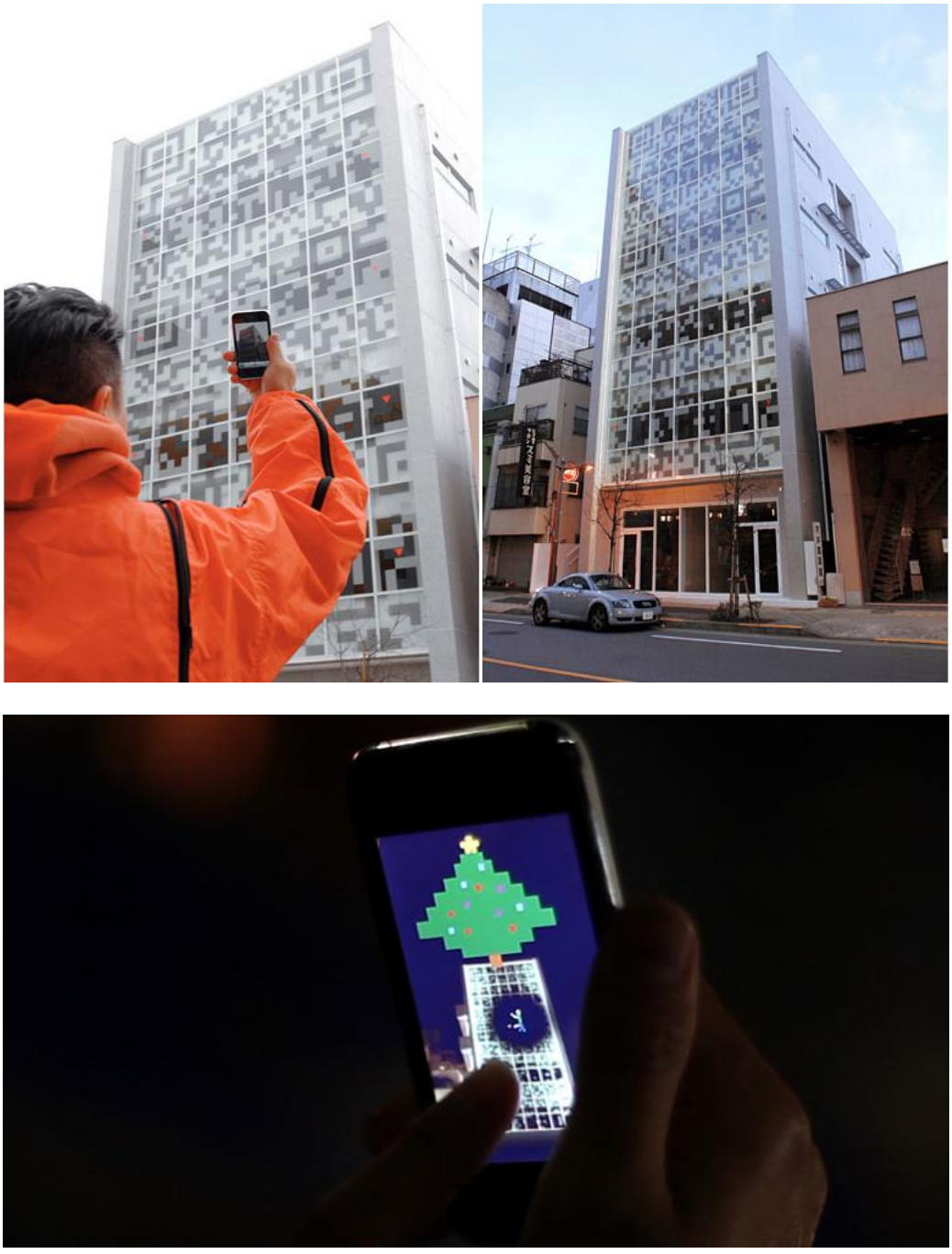

Figure 10 N Building

Author: terada design(2009)

Website: http://www.teradadesign.com/works/architecture/n-building.html

Problem: Building signage nowadays is taken for granted, driven past, and not noticed unless it is of importance to that particular person. If signage can have an element of interaction, then this may enable the user to interact with the brand which the signage associates with.

Solution: Terada design created a giant QR code signage game to allow the user to be able to interact with the building on a level which was uncommon for signage as we know it. The idea was to merge signage and technology, to allow a deeper installation in a real life environment. A mobile device was created to show a virtual reality to the activity of the people within the building. This idea of virtual reality, and location-based gaming and design is something that is made possible by the technology of mobile devices and the accuracy of the mapping systems available to these devices in real time.

The fun nature of the app made it easy to theme different nights based on its importance, above is shown someone interacting with the building around Christmas time, where Tera design have themed the building in its virtual reality to be ready for Christmas. The building is a great example of transforming something that is otherwise taken for granted, into something that is a feature piece on its street, and a talking point for people travelling past.

Success factors: When designing these interactives there are a few important aspects to take into consideration, here is a few that would be considered:

Tech - There are many aspects to this project that require technical knowledge. The two main aspects of technology that was prominent in the project were the QR code construction aswell as the the app. Both equally as important aspects of the project.

Planning - Planning would have been essential, especially considering the practical aspect of the project and the scalability of the project.

Testing - With the scale of the project, smaller scale prototypes would have been essential to the success of the planning and the design decisions going forward.

Case #: 51

Title: Peace Wall

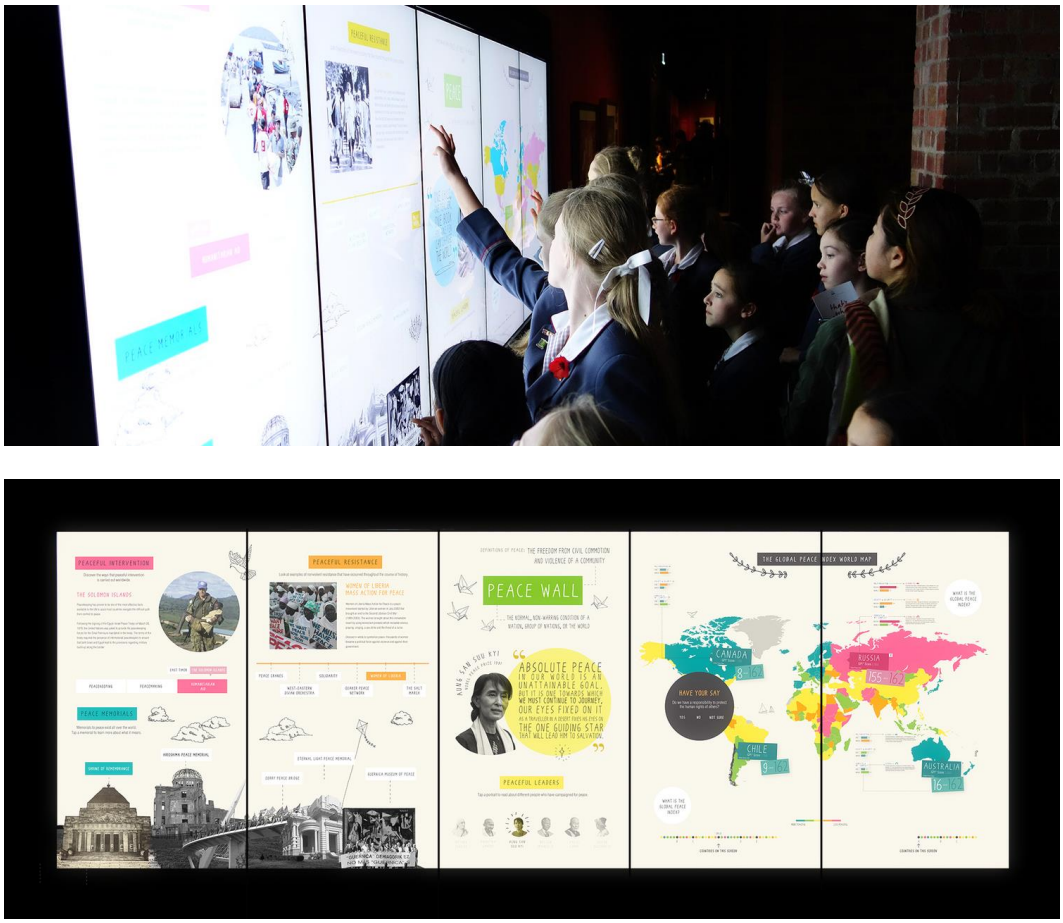

Figure 11 Peace Wall

Figure 12 Peace Wall

Author: Lightwell(n.d)

Website: http://www.lightwell.com.au/projects/peace-wall/

Problem: With all the chaos in this world, are there ways in which visual designers can promote peace and create a following to spread peace and positivity, rather than judgement and hate.

Solution: Lightwell created a Peace Wall, which is a five screen multi-touch installation created for the Shrine of Remembrance in Melbourne. Based on the concept of “peace” (whether it is attainable, how we can go about achieving it or whether it is even our responsibility to try), the team at lightwell “designed a project that lets visitors explore the issue and have their say. Interspersed with hand-drawn animations and a fully-interactive map that relays the most recent data from the Global Peace Index, this installation marks the conclusion to the new Galleries of Remembrance.” ()

Success factors: When designing these interactives there are a few important aspects to take into consideration. Here is a few aspects that would be considered: Interactivity - For something playful and highly touch focused, there needs to be a high concentration on making this interactivity crisp and streamlined, in order for the interactive piece to be effective. Visual style - As a peace wall is clearly trying to portray the essence of ‘peace’, and represent information in a positive manner, the visual style is very important to maintain the right message throughout the piece. Colour, typeface, illustration style is all very important to fit the narrative.

Case #: 36

Title: Kinetic playground

Figure 13 Kinetic Playground

Author: Seeper(2013)

Website: http://seeper.com/work/nokia-kinetic-playground

Problem: Seeper wanted to light up the night, and create a playground of reactive light, stop passers-by on London's South Bank and encourage them to play!

Solution: Kinetic Playground was created by Seeper, an interactive game based around a seesaw in a park. “Oscillating their way through stages, users were able to seesaw their way to a stunning light display.”(Seeper, 2016). This project takes a simple activity, and turns it into a spectacle. The idea of creating light and colour from movement is something very popular. However the quality and the scale in which Seeper created this installation made it a great success.

Success factors: When designing these interactives there are a few important aspects to take into consideration, here is a few that would be considered:

The right team - In this project, the selection of the correct team for the job would have been crucial. The large amount of technical knowledge that is required to setup and operate aa project like this is evident, as well as the program that was custom made for the operations of the project.

Interactivity - Seeper created a beautiful light installation from a very basic way of interacting and engaging the user. The seesaw interaction was a great way for the user to take ownership for the light show that they were making from their movement.

Testing - With many sensors, switches and programs connected to this simple installation, it was crucial for thorough testing to be made, especially being in a public domain, the need for a small setup time is evident.

Case study summary

It is clear from these case studies that the success of these come down to the following aspects as success factors: Testing, Team, Planning, Understanding the technology and understanding the project's interactivity.

These aspects stated are good examples of the types of things are important when creating an interactive piece. As discussed in section 2.2, planning and testing play a very large part in the overall success of the final project. If the designer does not explore and test their installation and technology, they are setting themselves up for failure, or tempting fate. Testing can be the difference between success and failure. As well, if there is no framework or plan set from the start of a creative project, then there may be a risk of the project losing focus, and going in an unneeded direction.

Team is one of the most important aspects of creating interactive pieces, as it almost guaranteed that there would be a small group that is part of the creation of an interactive. As discussed by Hudson & Glomb in section 2.4 "The heart of collaboration resides in developing a climate of trust and mutual respect."(Hudson & Glomb, 1997) . The team needs to be able to work exceptionally well together, and the knowledge of each other's strengths and weaknesses is key, this future proof the group for later on the project, and creates a healthy team dynamic.

From the case studies, it was evident of the high importance of understanding within the technology that is intended to be used in the interactive project. Alternatively, having the ability and time available to learn the technology needed. This understanding of the technology can derive from simply starting the

implementation and experimentation phase early, which will then create the time needed for the designer to experiment and gain a greater knowledge of the technology being used to create.

In conclusion to this section, it was interesting what emerged from the case studies of the above interactive design installations. It is evident that to have success in interactive design projects, there are aspects to consider as success factors for interactive projects, such as team, knowledge, planning, and understanding. These four success factors are a small example of many factors that will be discussed further in Chapter three.

2.5 Summary

This section will summarise the topics, and important points covered within this chapter.

Success in interactive design

In design, the definition of success often changes from project to project. However traditionally in the commercial world, there are some basics variables that will measure project success well such as Time, cost and quality. This considers Time to be representing a deadline for when a specific project is due. Cost is not just the physical cost such as money, but the intangible costs such as Time and energy. Finally, quality will be judged based on whether it fits the client's needs, and whether they are satisfied with the outcome or not, if there is no client, then it can be judged based on the potential target user for the design.

Creativity is about experimenting and discovering, and the new design era that has emerged is reliant on this approach for things to develop further. Designers should try to understand and to engage the creative within one's self. To step out into the unknown and to discover is something that is key when the need for creation is present.

Based on the findings within section 2.2, it is clear that there are many design processes that can be effective for many forms of design. The traditional waterfall approach can be a great process for the less creative and more structured projects. More importantly in this new age of design, the more flexible approach to design is something that will cater to the new projects that are emerging in this interactive age. Designers need freedom to experiment, ponder, refine and work in a free reign to move forward and to advance within the process. Iterative design processes can work well with the interactive projects regarding creating an early mock-up of design, and slowly refining this into a polished outcome. Although it is important not to take each design process too literally, and to cater them to the way in which the team may work, and the type of project that is being created.

As a creative, it is an acquired skill to know when to turn back to order and structure. However it is beneficial to look at how chaos can create outcomes, and how a small decision can end up affecting the overall outcome of the project in the end.

Collaboration is such an important part of creative work; designers should first understand how to structure collaboration in an effective way, and understand the important factors that play a part in the successful collaboration. Although it is important to collaborate in creative projects, there are proper ways in which to structure and approach the collaboration process to avoid unwanted issues in the future while creating interactive projects. An important part of section 2.3 when Hudson & Glomb talk about how they approach creativity “The heart of collaboration resides in developing a climate of trust and mutual respect” (Hudson & Glomb, 1997). In essence this is the most important thing when

approaching a collaborative project, to develop that element of trust in the other creatives involved.

It is clear from these case studies that the success of interactive projects depends on the following aspects as success factors: Testing, Team, Planning, Understanding the technology and understanding the project's interactivity. Although there may be other minor factors for success, these five key factors prove to be crucial to the success of interactive projects, especially large scale projects that require a team with a wide range of skills to help cover the variety needed.

The previous four topics are important when creating interactive design projects. Creativity is about experimenting and discovering, branching out into the great unknown. Choosing the right design process that will enable the designer to design with freedom is very important. To branch away from a step by step approach to design, and to look forward into a free flow way of approaching a problem. A well-structured collaboration model is key to success in a team environment, with a strong element of trust and respect being a major part of the success of the collaboration. From the case studies, there was a trend in the importance of aspects such as Testing, Team, Planning, Understanding the technology and understanding the project's interactivity. More light will be shed in regards to success factors within interactive design in the following chapter where Case studies from the researcher will be thoroughly examined, and a reflection of each project is presented in a structured and clear way to follow.

Chapter Three: Success Factors from Practical Work

3.1 Introduction

This chapter explores the success factors in interactive design projects in the light of several researchers created works. The research presents the projects and then reflects the success factors in each. For each project, important parts are highlighted from the projects such as milestones, development, challenges, descriptions and success factors. These parts pull each project apart and narrow down the challenges involved in each area. The projects range from branding, meta-design, generative design and interactive projects.

What are the success factors in the interactive design process? Chapter two covered Success, Creativity, Collaboration, and then went on to discuss a selection of case studies, from which initial success factors were identified. Chapter three extends the knowledge gained by the previous chapter, and methodically explores and inductively evaluates the success factors.

3.2 Methodology

With interactive design being very much experimental and practice focused, it seemed only fitting to use a practice-led research approach to this study. As Candy explains, practice-based research is concerned with “the nature of practice and leads to new knowledge that has operational significance for that practice. The main focus of the research is to advance knowledge about practice, or to advance knowledge within practice” (Creativity and Cognition, 2016).

In this practice-led research, the following methodology will be used when approaching the case studies. Each case study will be presented in the following structure, to show the outcomes of each project clearly.

Title: Title of project reviewed
Aim: A short description of the aim of each project.
Milestones: Milestones within the project that was important to the overall success.
Description: A detailed description of what the project is.
Challenges: Descriptions of any challenges that were highlighted within the project.
Technology: Description of technology used in each project.
Success factors: A thorough description of the success factors of each project, using the following template 'PTP' which is proposed in the following paragraph.

PTP Stands for Personal, Team, Process. From the key success factors in the case studies in chapter two, it was clear that a way to standardise the way success factors can be categorised provides a structure to enable useful comparison. The three PTP categories, in particular are relevant ways to segmented and review collaborative, interactive projects.

The following documented case studies were undertaken between the period of April 2015 to November 2015 as the practical observation of success factors within interactive design projects. As most interactive projects are made by a team (IVX), there were three people that feature in most of these projects. These people were: Emmanuel Turner, Emma Martin, and Ryan Neave.

In each project, members shared responsibility for different roles within the projects, and for each project stated which part the researcher played in each project. In contrast to most traditional design work, the collaborative environment in interactive projects is very important as highlighted in chapter two.

Outcomes and time:
This section outlines the amount of time this research (not the whole IVX team) spent on each project.

Static installations x3:	80 hours
Open day - Write your name in the stars:	60 hours
Beep Boop:	25 hours
BYOB - Cosmic handball:	40 hours
Glitch for zero one:	80 hours
Zero-one branding:	20 hours
University of Waikato Distinguished Alumni Evening	150 hours
	455 hours

3.3 Case studies

Title: Static installations

A collection of three small installations that were created as part of a promotional tool for ‘STATIC’, a night club in Hamilton.

Figure 14 Static Installations

Aim: To produce a series of small interactive installations to be displayed at a nightclub. The aim for these installations was purely for improving skillsets that were going to be crucial for future projects.

Description:

The static installations are a collection of three interactive installations that were created as a feature piece for a nightclub in Hamilton. These installations served a great purpose for the IVX team, as there was a large element of experimentation and concepts that went into each installation, with the aim of having a narrative for each small installation based on the theme created by the night club.

Milestones:

1- Establish Narrative

2- Choose technology

3- Use Narrative to develop interactivity

4- Create environment

5- Refine interactivity

6- Present

Technology: Leap, Projector

Success factors:

Personal - This project was fun and challenging for myself, as I managed to experiment with leap motion, and look into a deep narrative for the project.

Team - As a team, this project was a good chance to get to know how everyone worked. Each member played a small part in the project to make sure it was a success.

Process - The process for this project was focused on experimentation as a key part. Allowing the designers to dive into concepts, narratives and explore the possibilities that leap motion represents for future projects to come.

Title: Write your name in the stars

An interactive exhibition designed to get students inspired about the future of design.

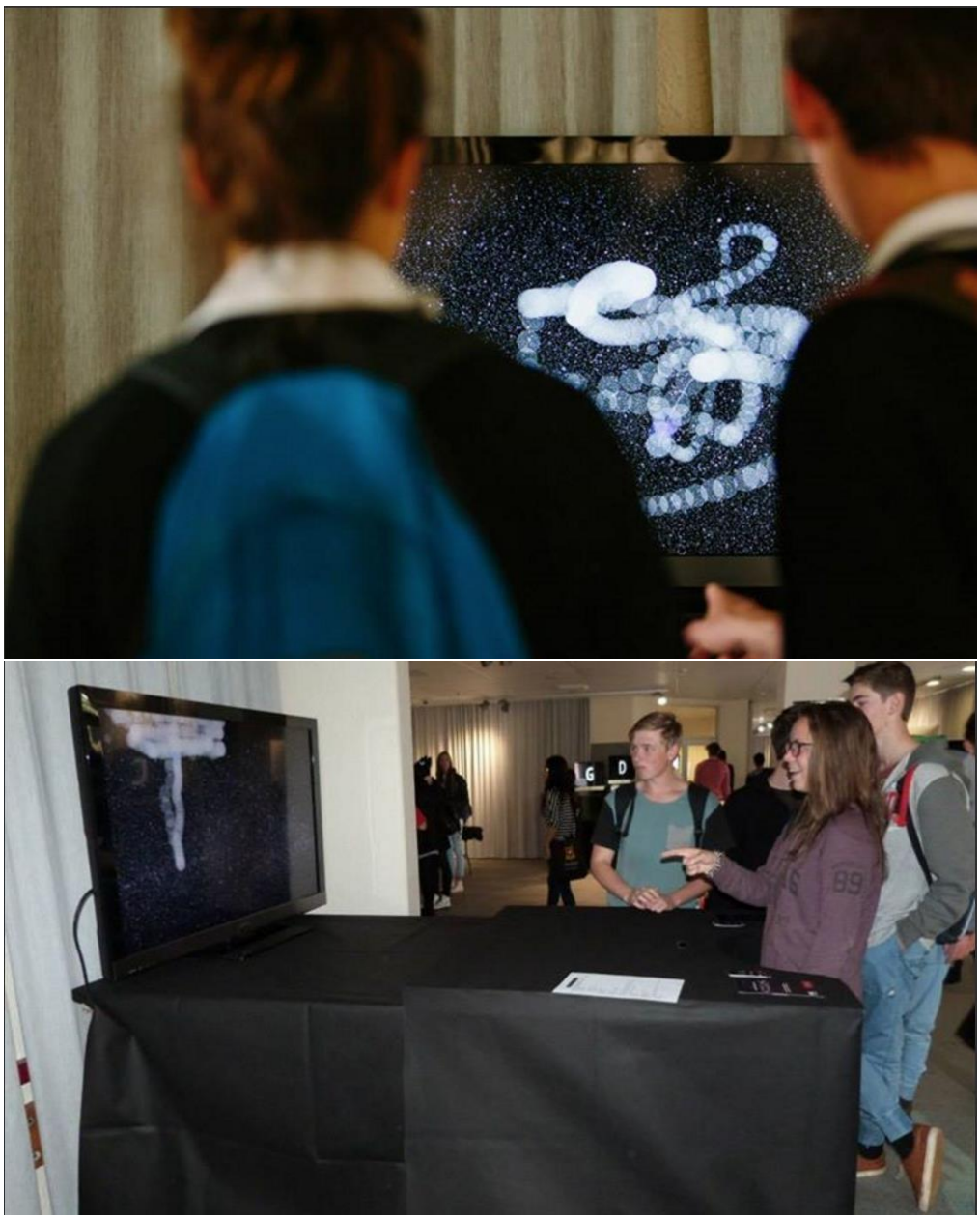

Figure 15 Write your name in the stars

Aim: To produce an interesting interactive to help engage new students at the annual open day.

Description:

‘Write your name in the stars’ was the start of our experimentation with leap motion, this was a fun and slightly challenging project that took a basic idea and executed it well. The project allowed the user to write with the leap motion and save their efforts, which would then be projected onto the ground. This idea of immersing the user in their created art is something that has a very large scope for something extraordinary in design. The ability for the user to feel fully responsible for the effect they have on the environment around them, and how they can affect that in a positive manner. This project was used as an inspirational tool for future students that were at the University’s annual open day. It was used to engage their interest and create a conversation with students to then hopefully convert that to a new student for the following year.

Milestones:

1- Establish Narrative

2- Choose technology

3- Use Narrative to develop interactivity

4- Create environment

5- Refine interactivity

6- Marketing material

7- Create and plan installation

Challenges:

Time frame:

This project was thought up a month in advance for the open day, and the brainstorming began straight after space was allocated.

Knowledge:

Leap was reasonably new for the team in this project. Therefore alot of time for experimentation was given for this.

Space:

The space given for the exhibition was challenging, as there was direct light hitting the

Technology: Leap, TV, OSC, tablet, projector

Success factors:

Personal - This project was a fun and challenging one for myself, as I managed to experiment with leap motion. Looking into a deep narrative for the project, the main concept behind ‘Write your name in the stars’ was to encourage the new students to dream big, make their mark, and to remind them that impossible is nothing. This project was a great way to show this through a basic initial idea.

Team - As a team, this project was a good chance to get to know how everyone worked. Each member played a small part in the project to make sure it was a success. The main challenge was for each member to agree with each decision for the project so that the direction of the project was not compromised.

Process - The process for this project was focused on experimentation as a key part. Allowing the designers to dive into concepts, narratives, and explore the possibilities that leap motion represents for future projects to come.

Title: Cosmic Handball

A multi display interactive conceptual game.

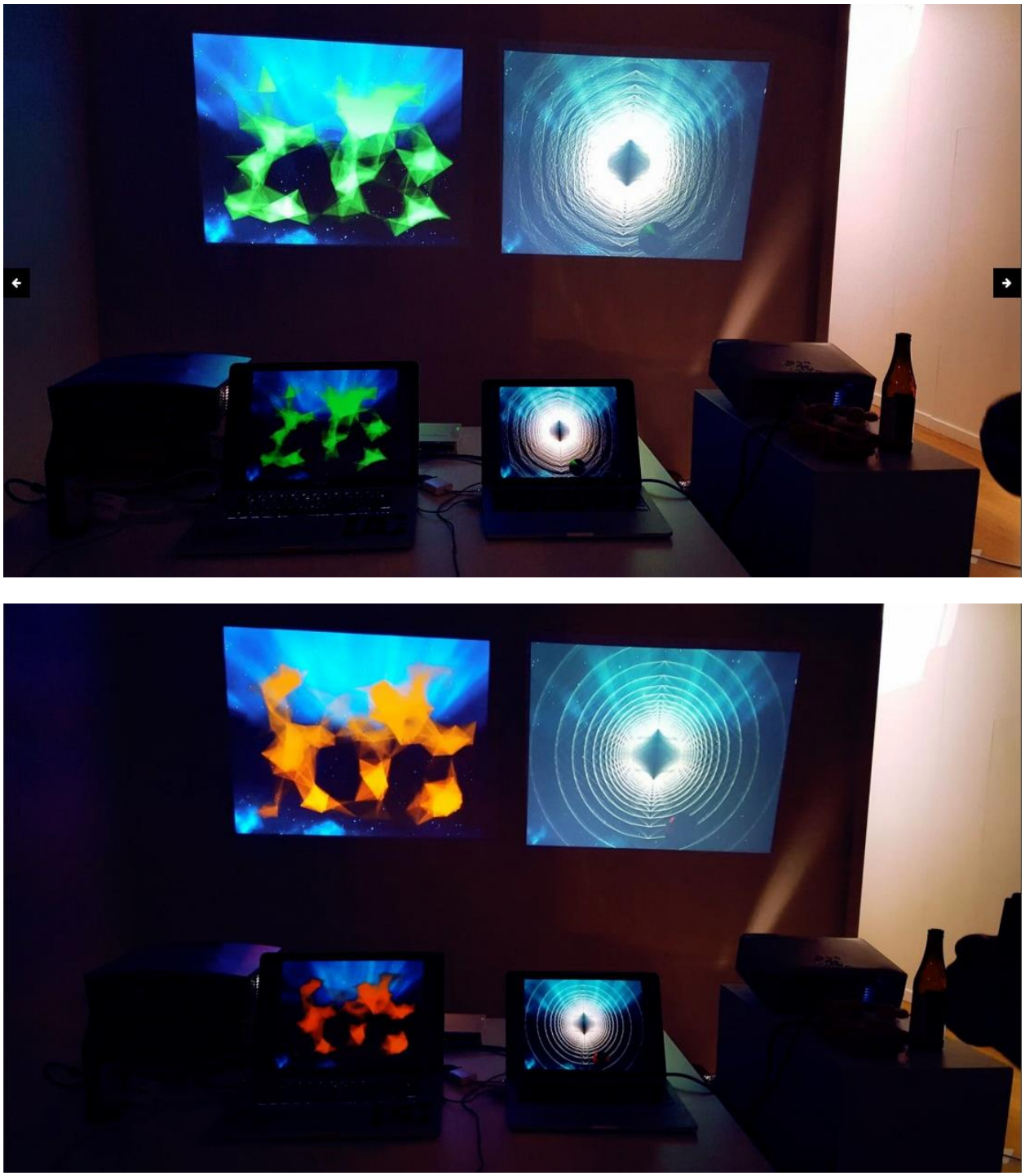

Figure 16 Cosmic handball

Description:

Cosmic Handball is an interactive installation created for a local collection of installations using projectors or some sort of light, BYOB (bring your own beam). This installation was created to play on the idea of sharing information. In essence, it has some concepts similar to a game, with two projector screens. This made the interactivity of the handball very important. The ball was a portal to the other world, and depending on the speed, the world's change. This idea of a portal instantly connects each user together and was the main concept that formed from the everyday world we live in today, with technology like Facetime, Skype SnapChat. The idea of a portal or a view into another world is not one that is foreign to most people.

BYOB is a yearly collaboration of artists based in Hamilton. The main constraints for the exhibition are that the project must have a projector in the exhibited pieces. The setup is restricted to the day of the exhibition opening, so vision and flexibility within the project is a must to have success at BYOB.

Project details:

Where: Wintec, Hamilton Central

What: Interactive installation using a projector, that fits into the BYOB theme.

When: 15/6/15

Duration of Exhibition: 1 night.

Public audience range: 50 viewers

Aim: To produce a unique interactive installation which fits within BYOB Hamilton, that is also flexible in setup and easy to pack down.

1- Concept confirmed

2- Technology was chosen

3- Narrative refined

4- Experimentation with technology and concept

5- Incorporate interactivity and connectivity (leap motion, and portals)

7- Finalise visuals

8- Final tweaks

9- Setup

Conceptual Development:

When creating this generative piece, we explored the idea of how portals and sneak peaks have been used in current technology to make us feel more connected to the world. This game was a remake of well known original and the idea was to hit the portal back to the other side of the screen. BYOB is a very conceptual exhibition, so exploration was encouraged, and a polished work was not necessary. This project was a good opportunity to broaden our technical ability, as well as exploring the idea of space and time in a small way.

Challenges:

Space - Space was allocated as a first in, first served basis. We were restricted to space about 2x2 meters.

Lighting - The input device used (leap motion) was effected by the projection and the dark light. This made it react unpredictably in some points of the night.

Challenges : Space, decisions, time frame.

Technology : Leap motion x2, Processing, Osc, Projectors x2

Success factors:

Personal - This project challenged my experimentation and concepts, as well as exploring a narrative to use for the project. Personally, I managed to explore the narrative of time and space and create a visually appealing graphic to show this exploration.

Time arrangement - This was crucial for the project to be successful. Although it was important to experiment with processing in order to get the desired outcome, the way the time was structured was to cater for experimentation with space, light, sound and video, as well as many teething problems initially.

Team - The team came together well, splitting three parts for the project evenly. One person each designed each world, and the interconnectivity was created by the third creative. We found splitting the project into sections was a great way to keep the balance of workload for each person.

Process - This project had many stages before it was completed. The stages consisted mostly of researching world recreation, concepts, experimenting, and creating. Experimenting and creating was developed into a loop that was used to further explore the concepts and the technology.

Creative freedom: Considering the way the interactive was created, experimentation is key when it comes to finding a different method of creating and approaching design problems, and creative projects.

ZeroOne branding

A meta-designed brand

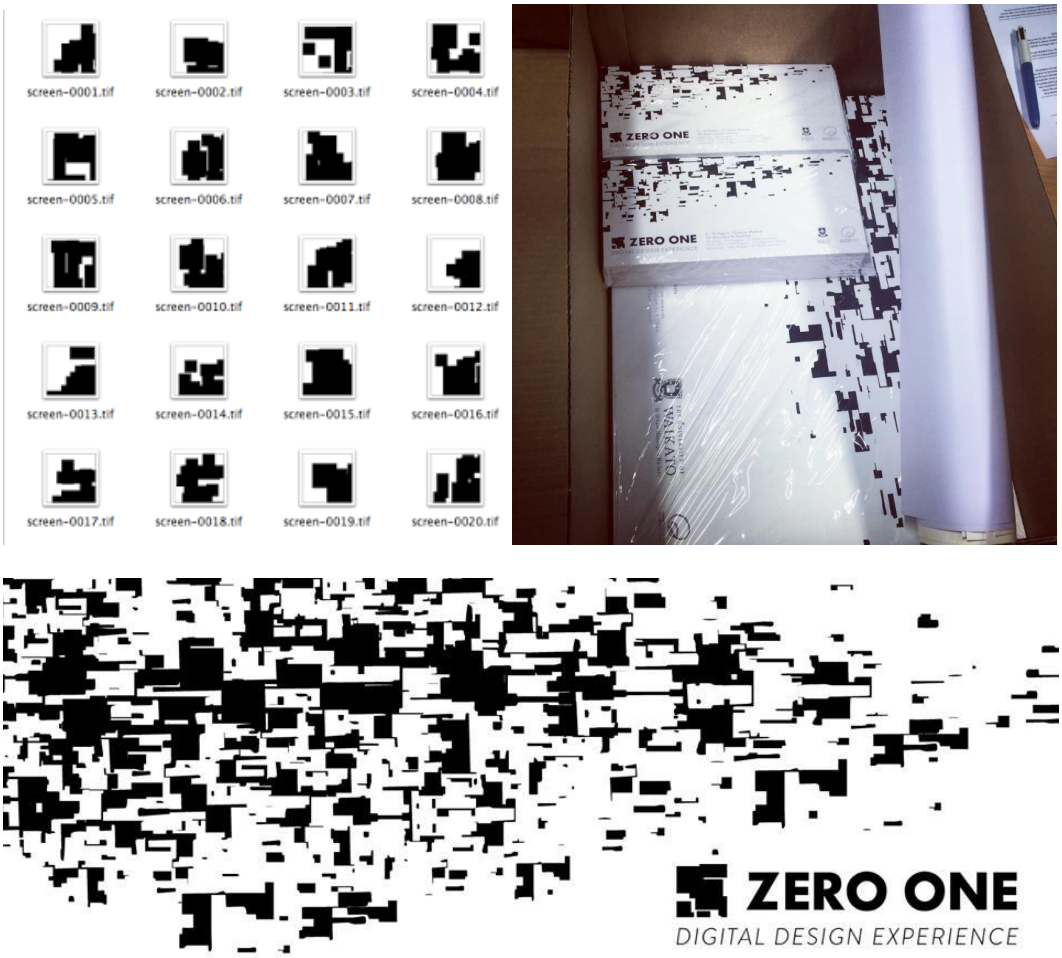

Figure 17 Zero One

Description:

ZeroOne is a digital design exhibition that was created with a collection of creatives with a similar aim in mind, to create a collection of interactives that follow a narrative. The branding for Zero One was unique in regards to the process of the creation of the branding. Instead of using the typical process of design, I looked into the way meta-design is used to create a unique design solution. This required a variety of experimentation, and research during this

process. The order of this loosely followed the praxis model, where the crossover of practice and research was encouraged in order to get the preferred outcome.

This way of working and learning encouraged me to be able to experiment more and develop something that was unique, and a direct product of the small program I created.

Project details:

Where: Creative Waikato, Alexander Street, Hamilton City

What: Branding for a digital design exhibition with a combination of works

When: 5/8/16

Duration of Exhibition: 5 days.

Public audience range: 50-100 viewers

Usage:

The ZeroOne branding was used on posters, fliers, a facebook event page, exhibition signage, and plaques before and during the Zero Exhibition held at Creative Waikato, August 2015, for two weeks. The ZeroOne exhibition was viewed by approximately one hundred and fifty people.

Aim: To produce a unique branding for the design exhibtion ‘ZeroOne’, using Generative design as the design system.

Milestones:

1- Create a logo generator.

2- Generate a batch of sample creations.

3- Choose three favourite variations the logos created.

4- Choose and develop a favourite shape

5- Start to incorporate text and create a complete logo

6- Use the graphics created to develop a theme for marketing material.

7- Develop the material to something unified throughout the deliverables.

8- Finalise branding, and create any other material needed, using the created process.

Conceptual Development:

Normally branding is reasonably straightforward in regards to the process that it requires, however after using the same process continuously the outcome of your creations becomes somewhat predictable. For this branding process, the aim was to explore a new way of creating a logo without the same predictable outcome. I created a small program to randomly generate logo outcomes. This enables the creator to select a logo outcome to develop then. Allowing them to have less ‘labour’ and still have creative control.

Challenges:

Time frame: The marketing material was given a 2 week window before they needed to be printed and replicated. This did not give the group a large amount of time to finalise these designs.

Group decisions: Like any groups, there is always conflict and clashing of ideas. This was no exception, although the group was open to most ideas created, there were many small compromises the designers, and the group made to get the material completed in the timeframe given.

Narrative: This exhibition had a curator to oversee the project. Therefore everything came back to the curator to be accepted or changed.

Success factors:

Personal -

This project was a challenge to be able to change the way I worked while creating a brand. I was able to enter the project with a decent understanding of the direction needed for this project. Although the process changed based on the way the logo was created, the challenges were mainly in development and using the simple program created as a way of developing a concept.

Team -

The group of creatives communicated to me what their vision was for the identity of zero-one. An individual created the branding, however, there were stages of critique that were crucial in the success of the logo.

Process -

The process that was used for this project was an adjustment to the normal design process. The reason being that most of the concepts and development was completed with the program that was created.

Here is a revised design process that was used in this experiment:

Research (traditional)

Theme decision (experimental process)

Visual experimentation

LOOP

(Iterative steps to eventually find a happy solution, and then move to a development stage)

Code production (experimental process)

Experimentation with program (experimental process)

Tweaking logo simulation (experimental process)

Generate 50 variants of the logo concept

Choose four variants

Develop the variants

Choose one variant to finalise

Add a type combination for the logo

Refine overall identity.

Use created draft logos to create marketing material.

This way of creating was a challenge to start with. However it became evident that meta-design can be such a great way to scale brands in the future, with the ability to generate logos and marketing material easily with the brand. This alone is enough to make this way of designing effective not only for creatives, but for companies with growth in mind, or events that need a reoccurring theme to be shown. The process had a twist to a traditional design process, with more emphasis on experimentation with technology in the concept phase, and development being purely tweaking the code to create a logo set that in usable in the future in material for promotion. As the scope for technology like processing is getting larger, it gives creatives a licence to experiment with this approach to design. The process needs to grow with this experimentation phase, and it is important that creatives realise this, to get the most out of the technology used.

Design decisions -

It was important to decide the style of the exhibitions identity initially to allow for creative direction. Naturally this derived from the direction of the overall exhibition.

Stages: This branding project was something that needed to be scaled into other material easily without major restructuring. This means that stages were important to ensure brand consistency was being implemented correctly.

Creative freedom: Considering the way the identity was created, experimentation is key when it comes to finding a different method of creating.

Title: A glitch world - Zero One

An interactive piece

Figure 18 A glitch World

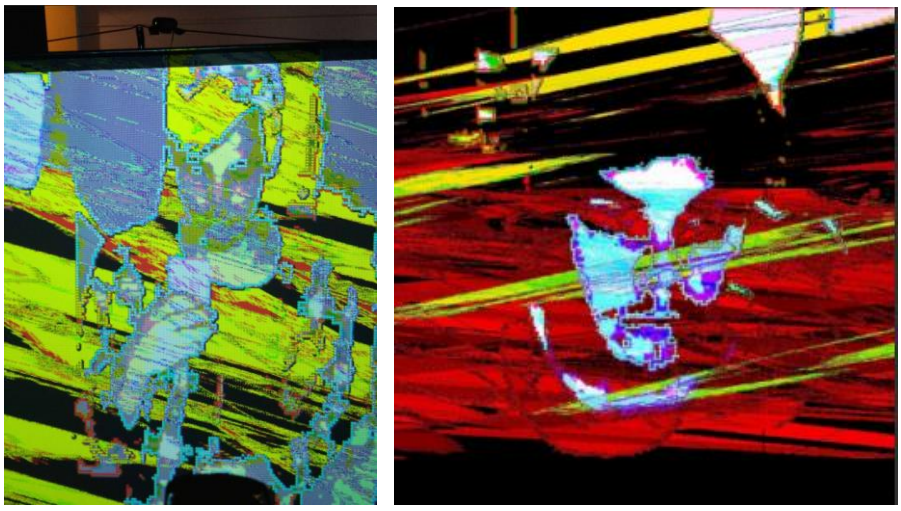

Figure 19 A glitch world

Description:

The glitch world was a piece in a design exhibition called zero one, where I was given a theme to design to, ‘getting lost in technology’. This theme gave me many ideas on how to create this in an interactive art piece. Glitch is such a growing medium to design in, and the chaotic element to some glitch graphics created was something that I wanted to explore in some level in this exhibition. Processing was used to create the main code base, and create the glitch graphics, which were manipulating a video stream. The process in which the

project was created was very free flowing, and experimental, with much time spent on the finer details to adjust the interactive to certain lights and the space being used.

Project details:

Where: Creative Waikato, Alexander Street, Hamilton City

What: Interactive piece for the ZeroOne Exhibition

When: 5/8/15

Duration of Exhibition: 5 days.

Public audience range: 50-100 viewers

Aim:

To produce a unique installation which fits within the Narrative of ‘Zero one’, which was ‘Getting lost in technology’. For the audience to be able to interact with and get an individual experience with.

Milestones:

1- Concept was chosen

2- Technology was chosen

3- Narrative refined

4- Experimentation with technology and concept

5- Create a glitch effect that merges with video

6- Add an interactive aspect to the installation

7- Set up the external webcam

8- Design spatial layout for exhibition

9- Dry run

10- Final tweaks

11- Final exhibition setup

Conceptual Development:

When creating this generative piece I looked at how the theme of being lost in technology can be viewed as a visual piece. I used different approaches on how to simulate this idea as an art piece. With these ideas, I started playing with basic programs, with weeks of experimenting I decided on a glitch effect to portray the 'lost' aspect of my exhibition. Glitch is such a strong motif in modern design, and it is used to show chaos, confusion, distortion, and noise, to name a few. The theme of being lost in technology fits perfectly into the glitch graphic, as well as fitting into the order of the narrative the project was given.

Challenges:

Space - We were restricted to space 2.5 x 2.5m to use, with a walkway to go through the installation to the next piece.

Curation - Negotiating the vision of the project with the curator

Lighting - Controlling the lighting became an issue with the installation, as a projector was used, and some lights affected the overall performance of the projector.

Technology:

Webcam, Processing, speakers, projector, blob detection.

Success factors:

Personal - this project challenged my patience and attention to detail, Although the majority of the project was completed reasonably quickly, there were many features and finer details that needed to be worked on for this project to be a success. Some vigorous testing needed to happen to make sure that the exhibition would run smoothly without crashing or complications. This almost took more time than the conceptual process.

Team - This was crucial for the project to be successful, although it was important to experiment with processing to get the desired outcome. The way the time was structured was to cater for experimentation with space, light, sound, and video, as well as many teething problems initially. The plan slightly changed based on the status of the project at each checkpoint of the project, to allow for success. This flexibility is a must when technology is a large part of the art piece you are designing.

Process - The process that was used for this project was more a free flow approach to creating. Experimentation was crucial in this project in the early stages of concepting. As well as in the development stages to make final decisions on final aspects of the aesthetic.

Here is a revised design process that was used in this experiment:

-Research (traditional)
-Theme decision (experimental process)
-Visual experimentation

-LOOP start (Iterative steps to eventually find a happy solution, and then move to a development stage)
Code production (experimental process)
Experimentation with program (experimental process)
Tweaking glitch effect (experimental process)

LOOP end

-Experiment with projection
-Webcam experimentation
-Tweak and experiment with combining both webcam and glitch effects for the final solution.

Title: Beep Boop, Quizz buzzers

An interactive quiz buzzer project

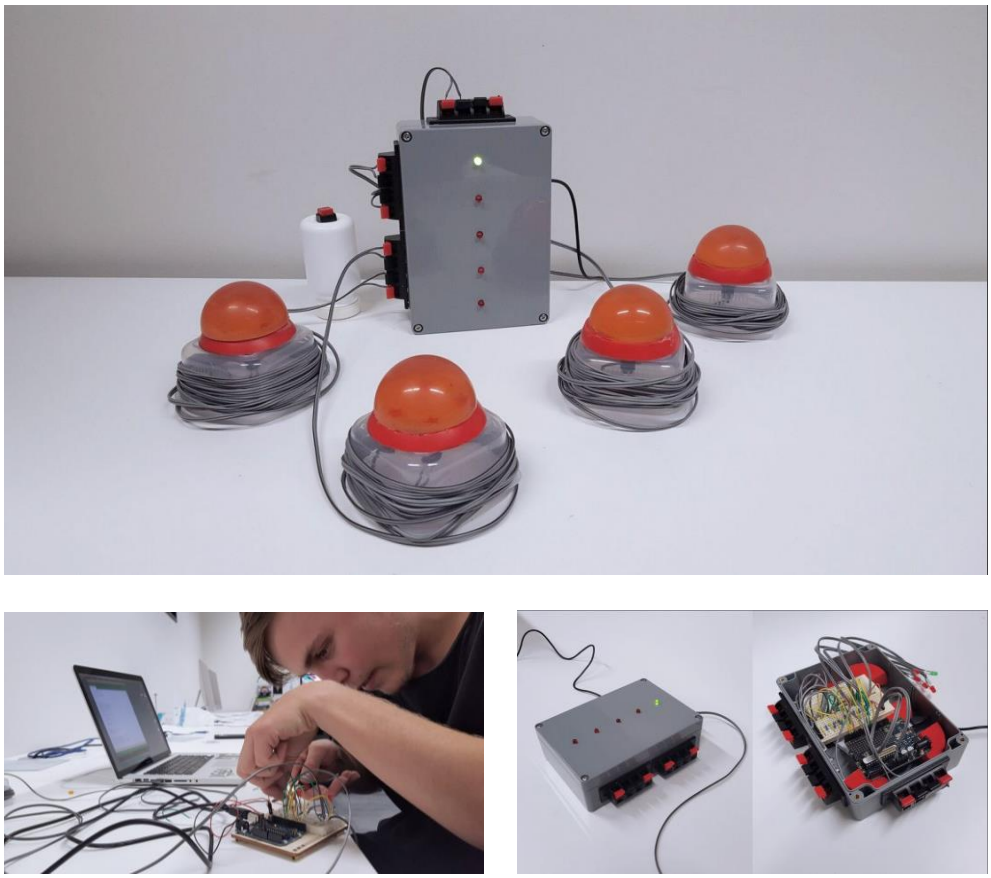

Figure 20 Beep Boop

Description:

Beep Boop was an attempt at a quiz buzzer for a team at Waikato University who needed to practice for a quiz competition. This took a fair amount of planning to create the quiz buzzers, from visualising how the buzzers will work, to how the end system will look. Planning was essential in this project, and it proved to be larger than we expected, not to mention the 24 hours straight to get the project completed. Being a different project that challenged our creativity in different ways, this was a refreshing change to creative installations. The process was more structured in the way it was developed. As there was a clear outcome for what the outcome will be on completion, the process was more set in stone,

although the experimentation aspect that is shown in others above was still evident on the programming side of the project.

Project details:

Where: University of Waikato

What: Quizz buzzers for the Universities quiz team

When: 24/8/15

Milestones:

1- Practice

2- Wire

3- Prototype with lights

4- Make buzzers

5- Wiring

6- solder

7- construct box

8- Test

Aim:

To produce a unique quiz game box for the university, as well as develop Arduino knowledge.

Challenges:

Timeframe: This project was completed in a 24-hour window, with some prior planning to ensure success. This made the 24 hours very crucial, and every step was important to complete so that the overall project was not compromised.

Knowledge: With limited knowledge of Arduino but basic programming knowledge, as well as being restricted by time, we had to learn basic Arduino skills quickly to be able to understand how to create a buzzer system.

Craft: With very little experience in circuits, we had to learn how to competently wire up a basic circuit board and use the solder gun to wire each buzzer. These are small but crucial tasks to make sure the project was a success.

Technology:

Arduino, LED's, switches.

Success factors:

Personal -

Personally this project was a challenge for each person, as we had mixed experience doing different aspects of this piece. For all of us, the aspect of time was a big challenge, as the night was sleepless. This made the small challenges even larger than normal. It was important for each person to work on their task critically and quickly, to ensure

Team -

The team came together to tackle this small project in a small period of time. Every aspect of the project was important, and the team looked at the experience of the individuals, and then created a plan based on what will be the most streamlined process for the completion of the project.

Process -

The process used for this project was different to the other projects, as the creative freedom was limited. This project was more focused on the interactive buzzer than a creative, narrative to theme the interactivity. As the technical side of the project was the main focus, a more structured approach was used.

1- Research quiz systems

2- Experiment with Arduino

3- Plan the order of the project

4- Split into roles

5- Work on programming, circuit board design, and box construction simultaneously

6- Merge the project together

7- Fix any complications while merging the different aspects of the project

8- Testing

9- Tweaking

10- Final product

Title: University of Waikato Distinguished Alumni evening

Figure 21 Distinguished Alumni Event

Description:

The distinguished Alumni event was something that our group was asked to help with. The University's Marketing and events department were looking for a very elegant evening to showcase Waikato University's Distinguished Alumni. This project was split into two main deliverables. One is the tree of light, and the other being an app which shows the menu for the night's arrangements. Both these

projects were a challenge, and both became connected for the night. Each table had two tablets, where they could change the colour of a branch on the tree. This idea of having the users being able to change their environment is such a topical theme throughout many interactive experiences. Because of this small amount of interactivity, the tree was continuously changing colours on the branches, and sometimes the colour combinations were amazing. The outcome was a very natural selection of colours. The app was also a food menu, as well as having information about each awardee for the night. The main challenge for the app was to get enough user testing for the app before it was used for the night.

Project details:

Where: Hamilton Gardens, Hamilton

What: Interactive app for the University's Distinguished Alumni event.

When: 20/09/15

Challenges:

Time frame - Although the timeframe was longer, the size of the project made up for the 'spare time' we thought we might have had, although having a workable budget was advantageous.

Knowledge - Throughout the project, there was a constant learning process that the whole team went through, with software that had not been used before, as well as the sheer size of the interactive being a lot larger than anything we have done in the past. The main thing that saved the team was the fact that time was given for experimentation in the knowledge of the new technology that was used. Giving us a buffer to explore with the technology and make mistakes until we started creating the main pieces for the night.

Technology - Technology used was OSC for communication, Processing, Adobe edge for the app design and animations.

Cost - Most aspects of cost were covered by the University. However we had to be more mindful of the cost, as it had to all be accepted as part of the budget for the evening.

Technology: Leap Motion, TV, OSC, Tablet, Projector

Aim: To produce an interactive app that communicates to the LED tree, the overall feel of the deliverables should be tied in with the ‘technology theme.

Milestones:

1- Establish Narrative

2- Choose technology

3- Use Narrative to develop interactivity

4- Create environment

5- Refine interactivity

6- Marketing material

7- Create and plan installation

Challenges:

Time frame: The project time frame was a challenge based on the sheer scale of it, and although our time frame looked generous, elements of the project were still restricted by time because of the amount of experimenting and learning that was involved in the project. A time frame of two months was given for the project, which the first month was taken up by the negotiation of a concept and conceptualising what the project could entail for our team. This made the actual

project work time frame more demanding than first envisioned, which made it crucial to go into the main deliverables with a set plan and an overall vision moving forward.

Group decisions: Like any groups, there is always conflict and clashing of ideas. This was no exception, although the group was open to most ideas created, there were many small compromises the designers and the group made to get the material completed in the timeframe given. Working with external clients, this introduced an extra element to think about, no longer was this a passion project, this was a project with a real fixed time frame for an event. Which made each decision made more important, and more difficult to get approval for last minute compromises or changes for the better.

Narrative: This project was overseen by the Marketing and Events Coordinators of Waikato University, and the narrative was a futurist Avatar/Tron inspired concept. This was achieved with the end result being a great success in all aspects of the event.

Success factors:

Personal -

Like most projects documented, this had its fair share of personal challenges, some of which were hard to overcome in the time frame given. Each part needed an element of learning and experimentation to make the most out of the project's deliverables. With each team member having their seperate parts within the project, it was crucial that each member succeeded to deliver their part for the overall project's success.

Team -

The team came together well for this project, based on each person's strengths and ability they each had a specific part to work on. With a collaborative environment, this meant that for some parts members might work together, and each person's opinion of any part of the project was listened to and feedback was encouraged. This makes for an environment with no walls, and everyone can have input into parts they feel can be improved. This way of working can be so rewarding, and the outcomes can be more polished, with more than just one creative making decisions, and discussions being had about certain decisions.

Process -

The process that was used for this project was an adjustment to the normal design process. Although concepts for the overall project followed existing models of design practice, the individual elements of the project had their personal twists on this model. With an element of development being evident throughout the project, this was crucial to the overall success of the project with things changing right up until the day before the event.

Here is a revised design process that was used in this project:

Research

Theme decision

Visual experimentation

LOOP

(Iterative steps to eventually find a happy solution, and then move to a development stage)

Code production (experimental process)

Experimentation with programs (experimental process)

Tweaking app and testing connectivity (experimental process)

Final installation setup and final tweaks.

Design decisions: It was important to keep in mind the Narrative of the overall event, this made it easy to make design decisions based on the theme for the night. Allowing us to always refer to this as a form of direction.

Stages: Considering the size of this project, it was evident that stages were going to be important to help break down the project into more achievable goals. For example, the app was split into a paper prototype, followed by a digital prototype, and then finally the final development that was eventually the final solution.

3.4 Summary

Summarising the above case studies, as well as shedding some light on the proposed PTP model for success factors.

Challenges:

The main challenges within the case studies were highlighted as: time frame, knowledge, and collaboration. The main design process that was used was a derivative of the agile design process covered in Chapter two.

With many of these projects having a short time frame, this was always a pressing issue with the type of projects being very experimental in their approach. Knowledge was also a common challenge, as some of these projects created were using technology that the designers involved were new to.

Therefore, this element of experimentation and learning was strong throughout many of these projects. The collaboration was also a challenge at times, as discussed in Chapter 2, Manageable numbers, Necessary and relevant expertise, diversity and Naivete, were key in collaboration within a group of creatives.

Success factors:

Using the PTP model that was introduced, it was easy to clearly see the success of each project in a structured way.

Personal: Based on the above case studies, personal challenges and success factors consisted of knowledge, experience, time frame and testing. It is important to think of these factors in a personal aspect to realise the challenges that come with learning new software, dealing with time restraints, and constantly trying to improve the piece of work being created in a personal point of view.

Team: Based on the above case studies, the Team challenges and success factors consisted of: Collaboration, communication and organisation. With time restraints evident, the team had to come together and be clinical with their organisation from the projects. It was important for communication and organisation within the team to be strong, for the overall collaboration of the team to be a success.

Process: As chapter two discusses, a derivative of the agile model of design is a strong process to use for creating interactive installations. The freedom it represents is a good model for incubating new and exciting ideas for interactive projects. With the process being different for each project, it ends up being up to

the judgement of the designer to decide when they need more structure, and when they need the freedom to create and innovate.

From the case studies, it is evident that success factors in an interactive design process can be categorised as PTP (Personal, Team and Process). PTP categorises three important aspects of an interactive design process and encourages the creativity, collaboration and design process discussed in chapter two.

Now that the case studies have been reviewed and summarised, it is important to look at how these success factors within Interactive design can then help to understand what challenges the designer goes through and how things can be improved. What other aspects of the three main features of PTP can help with the overall success of an interactive project?

Chapter Four: Summary and Conclusion

This chapter summarises the material covered in chapters two and three and discusses the relevance towards the research questions to reach conclusions. Recommendations are then made as to how to approach an interactive project, and how to apply PTP could be used as a model for thinking about how to have successful interactive projects.

4.1 Summary

This section summarises chapter two, and what was discussed and suggested in chapter three.

Firstly, in design, the definition of success often changes from project to project. However traditionally in the commercial world, there are some basics variables that will measure project success well such as time, cost, and quality. Creativity is about experimenting and discovering, and the new design era that has emerged is reliant on this approach for things to develop further. It is important to understand and to engage the creative within one's self.

Based on the findings within section 2.2, there are many design processes that can be effective for different forms of design. Designers need freedom to experiment, ponder, refine and work in a free reign to move forward and to advance within the process while designing interactive installations. Iterative design processes can work well with the interactive projects in regards to creating an early mock-up of design, and slowly refining this into a polished outcome. Teams should not to take each design process too literally and should

be prepared allter suggested processes to the way in which the team may work and the type of project that is being created.

As a creative it is important to know when to turn back to order and structure. However it is beneficial to look at how chaos can create outcomes, and how a small decision can end up affecting the overall outcome of the project in the end.

Collaboration is such an important part of creative work, and it is important first to understand how to structure collaboration in an effective way and understand the important factors that play a part in the successful collaboration. Although it is important to collaborate in creative projects, there are proper ways in which to structure and approach the collaboration process to avoid unwanted issues in the future while creating interactive projects.

Based on the case studies and the development of the success factors throughout the study, PTP is a useful tool when realising factors for success in interactive projects. The simple outline is easy to follow, and with the standardised categories, it makes it simple to follow and understand how to evaluate future projects. It gives a great general insight into where the factors are for success within the three categories created.

4.2 Conclusions

In conclusion to this study with the growth of technology and design, it was evident that from the outset of this study there was an opportunity to define what makes a successful interactive project and why. Throughout the study, through case studies and literature reviews, it was clear that the new era of design is upon us. Therefore the need for more understanding within this topic is crucial.

From the case studies recorded in chapter three, it is evident that Success factors in an interactive design process can successfully be defined as PTP (Personal, Team and Process). This categorises three important aspects of an interactive design process. Taking into consideration the creativity, collaboration and design process discussed in Chapter two.

The design process was an interesting topic throughout the study. Although the traditional design process can still be valid for more generic design projects, when collaboration is involved, there needs to be a consideration for how the collaboration will be structured, as discussed in chapter two. As well as the importance of correct collaboration, the design process is also important to take into consideration when creating interactive projects, as the outdated waterfall project will prove to be problematic when trying to complete an interactive project following this model. As discussed in chapter two, derivatives of the iterative design model are very effective while creating an interactive design project.

4.3 Recommendations

This following section defines the PTP (Personal, Team, Process) concept, developed to itemise the particular methodology used when looking into how to treat interactive design projects.

The three major categories are Personal, Team, and Process. Personal are the individual attributes and ways of approaching problems that will be beneficial to the individual. Team is group related, discussing what the important parts are to remember when working in a group with diverse talent. It talks about team cohesion, creative integrity communication, passion, and discusses the link

between them in regard to a team. Process is the final and arguably the most important aspect of the three categories. This section looks at what things might be viewed differently in the interactive design process, and why.

Personal

This section looks into what it takes personally to succeed in creating interactive works that stand alone and that have an impact. These tips will help creatives stop and think about things a little differently before they create. Personal factors include an open mind to take suggestions on board, to change. A can-do Attitude; This attitude will get the designer through problems and hard days when the project feels like it is going nowhere. In regards to work ethic and passion, passion being something that you need to find in something that you are interested in, a project or profession that you do not mind putting countless hours into. Vision is also a large part of the personal section.

Open mind

Ability to change, and adapt to better ideas, scrap ideas, freedom to change for a better / deeper interactive concept.

Can do / Attitude

Ability to solve problems, with simple solutions, can make a big impact.
For example some interactives can start with very simple input devices to get an idea of the overall functionality.

Work Ethic / Passion

Interactive work is time-consuming and can be very tedious, work ethic is important; when the pressure is on and time restraints are pushing, it is important to keep going with the same vision that the project was started with. Interactive

projects are something that takes a lot of trial and error, and patience in some stages of the process. The approach has to be one that is completely different that traditional design, as the variables involved, are more complex.

Vision

Vision is the ability to see the finish line. You may not see the complete product, however, be aware of the direction, and be sure that this is the right direction for this project. This vision and instinct will guide you through creative problems when things are looking blurry and unsure; it is important to look forward and carry on, rather than getting stuck on one part of the interactive.

Team

This section looks at what team/group aspects are important while creating interactive projects, what skill sets are required to create a team that will complement each other. What atmosphere needs to be created while in the team environment?

Work Ethic / Passion:

Interactive work is time-consuming and can be very tedious, work ethic is important; when the pressure is on, and time restraints are pushing, it is important to keep going with the same vision you started the project with. Interactive projects are something that takes a lot of trial and error, and patience in some stages of the process. The approach has to be one that is completely different from traditional design, as the variables are more involved, and somewhat more complex.

Cohesion:

Having the right people with the right skillset for the proposed project, complementary skills are key to making sure roles can be spread evenly and the project does not have a weak part overall.

Attitude:

Believe in what you do; this relates to vision. Stand up for what you believe in and do not let others get in the way of the overall vision for a project. In contrast to the above statement about integrity, it is also important to take other's opinions, and creative ideas into play, especially people that are not working on the project but have technical knowledge.

Passion:

Without the passion and love for something, you will run out of patience and lose focus when times get tough, unfortunately, you either have this passion, or you do not. It is important to find ways to keep the passion going when you get into a creative rut.

Process:

The process is an integral part of these overall steps and such an important part of the overall project. Whether it is a small project or a large scale interactive, the process is key to the overall success of the final polished product. Each project will be demanding in different areas, and in most cases, the process will change based on these areas. It is important to look at each project as a separate entity to each other, to fully understand the demand for each project.

Prioritising time:

Interactive projects have more ideation and theory involved in interactive projects; time management changed to promote more creativity in the ideation process. Some projects need more ideation time, or some projects may have several steps necessary to get to the final goal in mind.

Preparation:

The right tools, team, and the timeframe to make the process run as smooth as it possibly can go. There is always something that will jump out and surprise you, even if everything is planned out, planning will prevent the inevitable. Most early interactive pieces will have a small amount of setup.

Milestones:

Milestones can make a huge difference in regard to how we visualise the project; sometimes stages can be a more structured way to imagine the overall outcome of the interactive project. For example, in a large project, it might be better to split areas of that projects into milestones, to make sense of such a big task.

Vision:

The ability to see the finish line. You may not see the complete product, however, be aware of the direction, and be sure that this is the right direction for this project. This vision and instinct will guide you through creative problems when things are looking blurry and unsure; it is important to look forward and carry on, do not get stuck on one part of the interactive.

Failure:

Promote failure and experimentation; this means you have the courage to go the extra mile, and push the boundaries, take risks, look for new opportunities within the project to push that envelope even further.

4.4 Limitations on Applying the Recommendations

The recommendations are drawn from observations of the practical work and, as such, the recommendations are inductive in nature. This form of study, by design, trades robustness for coverage and its claims should be treated as tentative. Now that some specific claims are made, they can be the subject of more rigorous testing in future research.

It is recommended to use these points as a guideline for creating interactive projects, the main idea behind the steps is to think about how the process and the mindset change when creating interactive projects that will stand on their own. Every designer has their strengths and weaknesses, and this can be an advantage to know what these are as an individual. So the designer can work towards taking advantage of their strengths, as well as working on improving their weak points. The proposed design process is more flexible, and allows the designer to experiment more, which should allow them to trust their designer's instinct, and experiment with technology, question, critique, and improve. The idea behind this form of process is to encourage mistakes and to learn as part of a process. By taking some of the structure and predictability out of the process, we are left with some freedom to explore, freedom to develop, or to ideate, until the creative feels it is time to move into production.

4.5 Future Research

PTP is based on an observation of case studies and is used to highlight the success factors in interactive design. PTP can be used as a means of reflection, self-evaluation, and learning to refine the way creatives approach the design process. However, is this limited to just a reflection tool? Alternatively, can it be developed as a tool to plan within the design process to better understand and outline the way in which designers are creating in interactive projects?

This would require extra exploration into existing tools and methods for planning within the design, rather than a general observation of success factors and process.

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APPENDICES

Below is a collection of source code from some of the installations documented within chapter 2.

In addition to the source code, attached is also a copy of the spreadsheet which was used in Chapter 2 when sourcing interactive examples as case studies. This Collection of data was built as part of a 2015/16 Summer Research scholarship.

GLITCH, ZERO ONE EXHIBITION - Processing code

```
//-------------------------IMPORT LIB
import blobscanner.*;
import processing.video.*;
import ddf.minim.*;
import ddf.minim.signals.*;
import ddf.minim.analysis.*;
import ddf.minim.effects.*;
import glitchP5.*;

//-------------------------VAR

Detector bd;
PImage img;

AudioPlayer player;
GlitchP5 glitchP5;
Minim minim;
AudioInput input;
Capture cam;

//-------------------------SETUP

void setup()
{
size(1024,768, P2D);

img = createImage(1024,768,RGB);

background(255);
minim = new Minim(this);
glitchP5 = new GlitchP5(this);
 minim.debugOn();

 player = minim.loadFile("glitchS.mp3", 2048);
```

```
 // line in from Minim, default bit depth is 16
 input = minim.getLineIn(Minim.STEREO, 512);

 //frameRate(40);
 cam = new Capture(this);
 cam.start();

 bd = new Detector( this, 255 );
 }

//------------------------DRAW

void draw()
{

 if (cam.available()) {
    cam.read();
 }
 image(cam, 0,0);
 //player.play();
 int cols = 500;
int rows = 500;
int glitchx=0;
int glitchy=0;

// Declare 2D array
int[][] myArray = new int[cols][rows];
// Initialize 2D array values
for (int i = 0; i < cols; i++) {
 for (int j = 0; j < rows; j++) {
   myArray[i][j] = int(input.left.get(j)*50);
   glitchx = int(input.left.get(j)*50);
   glitchy = int(input.right.get(j)*50);
 }
}

// Draw points
for (int i = 0; i < cols; i++) {
 for (int j = 0; j < rows; j++) {

  stroke(myArray[i][j],0);
   point(i,j);
   glitchy=i;

 }
} glitchP5.run();

  glitchP5.glitch(rows, cols, glitchx, glitchy, 1024,768, 1, 1.0f, 10, 5);
}
void mousePressed()
{

saveFrame("output-####.jpg");
}
```

//-------------------------END

University of Waikato Open day, Write your name in the stars - Processing source code

```
import oscP5.*;
import netP5.*;
import com.leapmotion.leap.*;
//
// Change this to the network share where the program writes
final static String foldername = "/mnt/stars/";
//
PImage bg;
PVector fp;
ArrayList<PVector> points;
int maxBrushSize = 80;
float alphaVal = 50;
PGraphics canvas;
Boolean isDrawing = true;

//Variables for save screen
Boolean leapActive = false;
Boolean bDisplayMessage = false;
int startTime;
final int DISPLAY_DURATION = 3000;

//variables for joining dots
PVector circlePosition;
ArrayList<PVector> circleTrail;
int trailSize = 10;

// OSC vars
OscP5 oscP5;
//NetAddress myRemoteLocation;

//vars for delaying the UI
Boolean bSave = false;
Boolean bSaveDisplay = false;
Boolean bClear = false;

//
Controller leap = new Controller();
//
void setup()
{
 bg = loadImage("stars.jpg");
 size(displayWidth, displayHeight, P3D);
 canvas = createGraphics(width, height);
```

```
 image(bg, 0, 0);
 canvas.image(bg, 0, 0);

 PFont f = createFont("Arial-Black", 48);
 textFont(f);
 leapActive = true;

 circlePosition = new PVector(width*0.5, width*0.5);
 circleTrail = new ArrayList<PVector>();

 oscP5 = new OscP5(this, 10000);
}
//
//
void draw() {
 if (bClear == true) {
   bClear = false;
   image(bg, 0, 0);
   canvas.image(bg, 0, 0);
 } else if (bDisplayMessage == true) {
   if (bSaveDisplay == true) {
     leapActive = false;
     bSaveDisplay = false;
     bClear = false;
     bSave = false;
     println("saving yo");
     try {
       saveFrame(foldername + "######.png");
     }
     catch (Exception e) {
     }
     println("saved yay");
     fill(0, 200);
     rect(0, 0, displayWidth, displayHeight);
     fill(#FFFFFF);
     textAlign(CENTER);
     text("SAVING", displayWidth/2, displayHeight/2);
   } else if (millis() - startTime > DISPLAY_DURATION) {
     bDisplayMessage = false;
     leapActive = true;
     image(bg, 0, 0);
     canvas.image(bg, 0, 0);
     println("saved yo");
   }
 }
 if (leapActive) {
   canvas.beginDraw();
   Frame frame = leap.frame();
   Pointable pointer = frame.pointables().frontmost();

   if ( pointer.isValid() )
   {
     color frontColor = color( 255, 255, 255, alphaVal );
     InteractionBox iBox = frame.interactionBox();
     Vector tip = iBox.normalizePoint(pointer.tipPosition());
     float x = tip.getX() * width;
```

```
    float y = height - tip.getY() * height;
    float brushSize = maxBrushSize - maxBrushSize * tip.getZ();
    int trailLength;
    if (isDrawing) {
      smooth();
      canvas.fill(frontColor);
      canvas.noStroke();
      canvas.ellipse( x, y, brushSize, brushSize);

      canvas.fill(255, random(0, 174));
      canvas.ellipse( x + (random(-50, 50)), y + (random(-50, 50)), (random(1, 6)),
(random(1, 6)));

      circlePosition = new PVector(x, y);
      circleTrail.add(circlePosition);

      trailLength = circleTrail.size() - 2;
      println(trailLength);

      for (int i = 0; i < trailLength; i++) {
        PVector currentTrail = circleTrail.get(i);
        PVector previousTrail = circleTrail.get(i + 1);

        stroke(255, 255, 255, 100);
        strokeWeight(2);
        //filter(BLUR,6);
        line(currentTrail.x, currentTrail.y, previousTrail.x, previousTrail.y);
      }
      if (trailLength >= trailSize) {
        circleTrail.remove(0);
      }
    }

    image(canvas, 0, 0); //Draw canvas to screen
    fill(0, 0, 255, 100 );
    noStroke();
    ellipse( x, y, brushSize, brushSize); // draw cursor

    if (brushSize <=10) {
      fill(255, 0, 0, 100 );
      rect( x, y, 40, 40);
    }
   }
   canvas.endDraw();
 }
}
//
void keyPressed()
{
 if (key == ENTER) {
   doSavePrint();
 } else if (key == ' ') {
   doClear();
 }
}
//
```

```
void oscEvent(OscMessage theOscMessage)
{
 String oscAddress = theOscMessage.addrPattern();
 print("OSC: " + oscAddress);
 if (oscAddress.equals("/btnClear")) {
   print(" : doClear()");
   doClear();
 } else if (oscAddress.equals("/btnSave")) {
   print(" : doSave()");
   doSavePrint();
 }
 println(" ");
}

void doSavePrint() {
 bDisplayMessage = true;
 bSaveDisplay = true;
 bSave = true;
 startTime = millis();
}

void doClear() {
 bClear = true;
}
```

BYOB (Bring your own beamer) Galactic Nightmare Processing source code

```
/* Galactic nightmare: Cosmic Handball
by IVX for BYOB 2015, Hamilton

A Dog's Life: Emma Martin
Galactic nightmare: Ryan Neave
Cosmic Handbkalall: Emmanuel Turner

DEBUG code: please place your code where indicated
*/

//import processing.opengl.*;

//--------------------------------------SCREEN--------------------------------------
import processing.opengl.*;

final static int     sHeight        = 768;
final static int     sWidth         = 1024;
final static String  sEngine        = P3D;
final static int     sBallSize      = 120;

//--------------------------------------PRE VAR-------------------------------------

PImage imgOtherSide = null;
PGraphics pgball, pgballmask, pg;
int ballx, bally;
boolean ballon = false;
```

```
boolean chosenClr =false;
boolean triggered = false;

//--------------------------------------RN VAR----------------------------------------

PImage bg;
int fc, num = 420, edge = 70, maxDist=70, t=0, o=20;
Ball[] balls = new Ball[num];
ArrayList<Triangle> triangles;
//color e = 255, d = #CE0071, c = #A154CB, b = #04819E, a =  #8e41d5 ;
color b = #CE0071, c = #9240d5, d = #04859d, e =  #62e200, f = #ffd000, g =
#ff6c00;
color[] cols = {
 e, d, c, b, g
};


//-----------------------------------RN SETUP-----------------------------------------

void setup() {
 size(sWidth, sHeight, sEngine);
 createStuff();
 bg = loadImage("galax.jpg");

 //-----------------------------------PRE SETUP----------------------------------------

 frameRate(20);
 pg = createGraphics(sWidth, sHeight, sEngine);
 pgballmask = createGraphics(sWidth, sHeight, P2D);
 imgOtherSide = loadImage("left.jpg");
}

//-------------------------------------DRAW-----------------------------------------------

void draw() {
 background(bg);
 pg.beginDraw();
 if (mousePressed && mouseX >= 0 && mouseX <= sWidth && mouseY >= 0 &&
mouseY <= sHeight) {
   ballon = true;
   ballx = mouseX;
   bally = mouseY;
 } else {
   ballon = false;
   ballx = bally = -1;
 }

 pg.endDraw();

 //-------------------------------------TRI DRAW-----------------------------------------

 triangles = new ArrayList<Triangle>();
 Ball b1, b2;
 for (int i=0; i<num; i++) {
   balls[i].move();
   b1 = balls[i];
```

```
   b1.neighbours = new ArrayList<Ball>();
   b1.neighbours.add(b1);
   for (int j=i+1; j<num; j++) { // 'i' to avoid having doubles, and '+1' to avoid
comparing a ball to itself (I think...)
     b2=balls[j];
     float d = PVector.dist(b1.loc, b2.loc); // comparing the location of both balls
     if (d>0 && d<maxDist) {  // if b2 is in the range then add it to the list of
neighbours
       b1.neighbours.add(b2);
     }
   }
   if (b1.neighbours.size()>1) { // if there are at least two neighbours then add the
triangle(s) the the triangles array
     addTriangles(b1.neighbours);
   }
 }

 drawTriangles();


 //-------------------------------------MSK DRAW-----------------------------------------

 //image(pg, 0, 0);
 if (ballon) {
   pgballmask.beginDraw();
   pgballmask.noStroke();
   pgballmask.background(0, 0, 0, 0);
   pgballmask.fill(255);
   pgballmask.ellipse(ballx, bally, sBallSize, sBallSize);
   pgballmask.endDraw();
   imgOtherSide.mask(pgballmask);
   image(pgballmask, 0, 0);
   image(imgOtherSide, 0, 0);
   noStroke();
   strokeWeight(7);
   noFill();
   ellipse(ballx, bally, sBallSize + 4, sBallSize + 4);
 }
}

//-------------------------------------CR8 DRAW-----------------------------------------

void createStuff() {
 // creating the location of the rotating reference points
 for (int i=0; i<num; i++) {
   balls[i]=new Ball();
 }
}

//-------------------------------------TRI ADD-----------------------------------------

void addTriangles(ArrayList<Ball> b_neighboors)
{
 int s = b_neighboors.size();
 if (s > 2)
 {
```

```
  for (int i = 1; i < s-1; i ++)
  {
    for (int j = i+1; j < s; j ++)
    {
      triangles.add(new Triangle(b_neighboors.get(0).loc, b_neighboors.get(i).loc,
b_neighboors.get(j).loc));
    }
  }
 }
}

//-----------------------------------TRI COL-----------------------------------------

void drawTriangles()
{

 t=t+1;

 fill(g, int(random(15, 20)));
 if (t>80) {
  fill(b, int(random(15, 20)));
 }
 if (t>160) {
  fill(c, int(random(15, 20)));
 }
 if (t>240) {
  fill(d, int(random(15, 20)));
 }
 if (t>320) {
  fill(e, int(random(15, 20)));
 }
  if (t>400) {
  fill(f, int(random(15, 20)));
 }
 if (t>480) {
  fill(g, int(random(15, 20)));
  t=0;
 }


 //-----------------------------------INTRUDER ALERT---------------------------------

 if (ballx > sWidth/3 && ballx < (sWidth - (sWidth/3))) {
  if (bally > sHeight/3 && bally < (sHeight - (sHeight/3)))
  {
    fill(cols[int(random(cols.length)) ], o);
    filter(INVERT);
    triggered = true;
    println("triggered");
  }
 } else {
  triggered = false;
  filter(NORMAL);
  println("safe");
 }
```

```
 //-------------------------------------------------------------------------------------
 noStroke();

 beginShape(TRIANGLES);
 for (int i = 0; i < triangles.size (); i ++)
 {
   Triangle t = triangles.get(i);
   t.display();
 }
 endShape();
}

//-----------------------------------KEY PRESS-----------------------------------------

void keyPressed() {
 if (key=='s') {
   saveFrame();
 }
 if (key=='c') {
   createStuff();
 }
}

//-----------------------------------CLASS BALL----------------------------------------

class Ball { //Ball class

 ArrayList<Ball> neighbours;  // arraylist of the 'ball' itself and all the others balls
whose distance < maxDist to it
 float theta, radius = random(20, 60);
 float offSet = random(TWO_PI);
 float spd = random(.2,.3);
 int dir;
 PVector org = new PVector(random(edge, width-edge), random(edge, height-
edge));
 PVector loc = new PVector(org.x+radius, org.y);

 Ball() {
   dir=random(1)>.5 ? -1 : 1; // clockwise or anti-clockwise
 }

 void move() {
   loc.x = org.x + sin(theta+offSet)*radius;
   loc.y = org.y + cos(theta+offSet)*radius;
   theta += (spd/2*dir);
 }
}

//-----------------------------------CLASS TRI-----------------------------------------

class Triangle  //Tri class
{
 PVector A, B, C;

 Triangle(PVector p1, PVector p2, PVector p3)
 {
```

```
   A = p1;
   B = p2;
   C = p3;
 }

 public void display()
 {
  beginShape();
   vertex(A.x, A.y);
   vertex(B.x, B.y);
   vertex(C.x, C.y);
   endShape();
 }
}

//-------------------------------------END----------------------------------------
```