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The Design Process for XR Experiences

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The Design Process for XR Experiences

by

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Thesis

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Abstract

The Design Process for XR Experiences

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The act of telling stories has been a core part of the human experience since the days of cavemen standing around a fire to tell the story of the day's hunt (Balter). As new technologies are being developed, such as virtual reality headsets and cellphones with augmented reality capabilities, the designer's process has been challenged. We are increasingly living in a world where human experiences are separating from physical reality and moving toward an extended reality or XR. "Extended Reality" (XR) is the umbrella term used to describe VR (Virtual Reality), AR (Augmented Reality), and MR (Mixed Reality) as well as all future realities [any new experiences that might be created outside of the already existing realms] such technology, might bring. XR covers the full spectrum of real and virtual environments" (Scribani). The challenge Designers are facing

is how to effectively tell engaging stories using new and increasingly prevalent technologies within the XR envelope. Many experiences utilizing XR tend to focus on the technology and tools rather than the story. XR is the new "Wild West" in storytelling. There are no hard rules and no defined creative processes for crafting a successful experience within the technology.

This thesis asks the question, can the theatrical design process help to create more successful XR experiences? Success being more social interaction and long-lasting engagement. Can a focus on human-centric stories make the experiences more engaging? In this thesis, I will be investigating three XR experiences and their varying design processes. The evaluation of this research will be qualitative rather than quantitative. The success or failure of these experiential XR designs will be determined through the lens of a collaborative theatrical designer.

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Chapter 1: The New Frontier of Storytelling

"Exploration is in our nature. We began as wanderers, and we are wanderers still. We have lingered long enough on the shores of the cosmic ocean. We are ready at last to set sail for the stars." Carl Sagan

THE WONDERER

When I was young, at night, I would sneak out of the back door of my childhood home. But unlike other kids my age, I was not gallivanting off to meet some young love or escaping around town drinking with the boys. I was sneaking out to go stargazing late into the night. The thing about growing up on a small ranch in southwest Missouri (30 minutes south of Branson) was there wasn't much trouble one could get into, but there was a lot of exploring to be done. Being in the middle of nowhere allowed for the most amazing stargazing a nerd like myself could hope for. The desire to explore and understand the universe around me was prevalent at a young age. As I grew, I was especially curious about the technology and electronics around me.



Illustration 1: When I was young, I would always attend Space Camp in Huntsville, Alabama, every summer.

I remember when I was in junior high, my father (who is a chemistry professor) would bring home old lab equipment that was no longer functioning. I would love to break down those old machines just to see if I could figure out how they would work. Looking back at these moments of my childhood, I think I just wanted to know why things worked the way they did. I loved being tested, and studying the stars and complex mechanics gave me a challenge. It questioned my understanding of this world.

College was never optional for me; it was the expectation. The choice of where to go was not difficult for me. From the start of high school, I knew I wanted to study aerospace engineering, and I needed to go to the number one school for it, Embry Riddle

Aeronautical University in Daytona Beach. During my time there, I studied Electrical Aerospace Engineering. On multiple occasions, I was able to head down to Cape Canaveral and watch NASA shuttle launches.



Illustration 2: My friends and I at Cape Canaveral watching a NASA shuttle launches.

At this time, I started to become fascinated by the crowds who showed up to the shuttle launches. I loved watching the spectators; they had the same emotion I had when I was young, staring at the stars, wonder. Not unlike many of my peers, I had a hard time figuring out what I wanted to do after graduating from college. I ended up landing a fantastic opportunity to work for T.L. Mobile Television as an engineer working on ESPN sports broadcasts.

While working with ESPN, I saw how Technology played an essential role in the entertainment industry. One of the last games I worked on, as a broadcast engineer, was a Duke University vs. North Carolina basketball game. For this broadcast, it was determined that the match would be streamed to Bristol, Connecticut (central office for ESPN) through fiber-optic lines, a first for ESPN. Fiber lines allow for massive amounts of data to be transmitted long-distance using light waves. Most games at that time used satellite transmission for sending video back to Bristol. By switching to fiber transmission, it reduced the cost significantly and could eventually allow for more control of the broadcast to be in Bristol. By using fiber communication lines, we opened up the possibility for more sporting events to be broadcasted simultaneously and consequently was the genesis for ESPN+.

After a successful tenure with T.L. Mobile and ESPN, I was hired by Royal Caribbean to take charge of live entertainment lighting and media design in the Asia market. This position came with several challenges for me. Not only was I doing a job in an industry in which I had not much knowledge (theatre), I also moved to Tianjin China working in a language (mandarin) that I was just beginning to learn. Even with these challenges, I was able to learn a lot about theatrical design and working in live entertainment. Most of the productions I designed for Royal Caribbean were centered around what the directors described as "a flashy look". I was given a list of songs to generate the design from without consideration or discussion about narrative. This lack of consideration for storytelling challenged me to inquire if the audience's engagement was being hindered by gimmicky tech. After two years with Royal Caribbean, this question that

I had was not being answered. At that point, I decided it was time to go back to school to understand audiences and storytelling better. In the fall of 2017, I was admitted into the MFA program at the University of Texas at Austin to study Integrated Media for Live Performance.

WHAT IS EXTENDED REALITY

During my research at UT, I stumbled across an essay on how to read theatrical plays called *EF's Visit to a Small Planet: Some Questions to Ask a Play* by Elinor Fuchs. In the article, Fuchs describes these plays as full worlds, and we need to take a step back when reading to see the whole world of the production.

A play is not a flat work of literature, not a description in poetry of another world, but is in itself another world passing before you in time and space. Language is only one part of this world. Those who think too exclusively in terms of language find it hard to read plays. When you "see" this other world, when you experience its space-time dynamics, its architectonics, then you can figure out the role of language in it (Fuchs).

When creating XR designs, the space or the "theater" for these experiences is often referred to as virtual worlds and take on similar architectonic characteristics that Fuchs refers to in the above quote. The virtual worlds tend to have a much more complicated story system than what you would find in traditional theatre. These stories tend to be layered with backstories, Easter eggs, subplots, and multiple outcomes; many times, the audiences never see these. Extended reality, or XR, has become the term used in the

academic field for the technologies used to create these virtual worlds. "Extended Reality (XR) is the umbrella term used for VR, AR, and MR, as well as all future realities such technology, might bring. XR covers the full spectrum of real and virtual environments" (Scribani). The term, XR was initially known as mixed reality; now, MR is seen as the space between AR and VR. The best way to understand what technologies can be considered XR tech is to look at the Milgram reality–virtuality continuum. This continuum was first proposed in 1995 by Paul Milgram, a leader in human factors engineering research, during his time at the Industrial Engineering Department, University of Toronto, Canada (Milgram et al.). In Figure 1, we can see the original reality-virtuality continuum. In this model, the real world, the real environment, is to the left of the continuum, whereas full virtual environments are on the right. It is important to note that Milgram does not title this far-right section "virtual reality" as this allows for advancement in technology.



Figure 1: Milgram Reality–virtuality continuum

All areas within XR can be used for compelling and engaging experiences. Augmented reality tends to have a stigma with it in the experiential design community, as it is most commonly thought of as those cheesy face filters that are all over our social media apps (Ffiske 86). Although these dreadful filters are an entry point for the mass populace

into XR, they lack any narrative and do not allow the user to see the true potential of AR. A recent successful example of AR is a promotion for Fox Network's television show 'Lego Masters.' In this experience, users are given a prompt on what to build; then, using the camera on their phones, they can place digital Legos together to create the virtual object. They then can share a picture of their build with a vast community and even compete to win prizes and be shown off during the television show (Pallandino).



Illustration 3: My first build in Lego Masters AR

What is now known as mixed reality or what Milgram called augmented virtuality can be hard to explain. It lives in the place between augmented reality and virtual reality. Virtual worlds that are created with MR can be very different from each other, and they utilize various tools. This fact makes it hard to pinpoint what MR is. One of the best

examples I like to point to is *Draw Me Close: A Memoir*, an interactive theatre play produced by the National Theatre.

Weaving theatrical storytelling with cutting-edge technology, the project takes a deceptively simple and humanistic approach to the immersive medium: it allows the audience member to experience life as Jordan inside a live, animated world. Jordan Tannahill's mother is played by an actress whose movements are translated into the virtual world using motion capture while she engages with you in the physical world. Both actor and audience member experience an early childhood memory as they bring it to life (*Draw Me Close* | *National Theatre*).



Illustration 4: The audience member wearing a VR headset and the actor interacting with them (*Draw Me Close* | *National Theatre*).

Virtual Reality is not a new technology (View-Master devices have been around since the 1930s), but recently, more powerful technology has become more readily available to a mass audience. In the reality-virtuality continuum, VR is at the far right side,

but this technology can build vast virtual worlds and be a powerful storytelling medium if it is utilized with consideration and skill. *Traveling While Black* is an award-winning VR short film that not only does a fantastic job immersing the viewer in a dynamic virtual world, but it delivers a powerful message. The viewer is transported into Ben's Chili Bowl, a Washington, DC café, and as the film progresses, they learn the stories of black Americans traveling around the country or just local to DC (McClinton).



Illustration 5: A view from inside the VR headset during *Traveling While Black* (McClinton).

THE THEATRICAL DESIGN PROCESS

In theatre, everything revolves around the story. Before any design process can take place, the story must be thought out.

Theatre begins and is grounded in a story. The story, usually created by a playwright in the form of a script, is the foundation for the collaborative theatrical experience; it is the central work that all of the other artists interpret. (Brewster and Shafer)

Once a story is selected, the design process can begin. The design process for the theatre is a method for breaking down the creation of a project into controllable parts. This design process follows a predetermined sequence but is not always linear. It is iterative, and often, the designers cycle back to make sure that the story is still at the center of the design, as shown in figure 2. The steps of the sequence are commitment, analysis, research, incubation, selection, implementation, and evaluation. (Gillette)

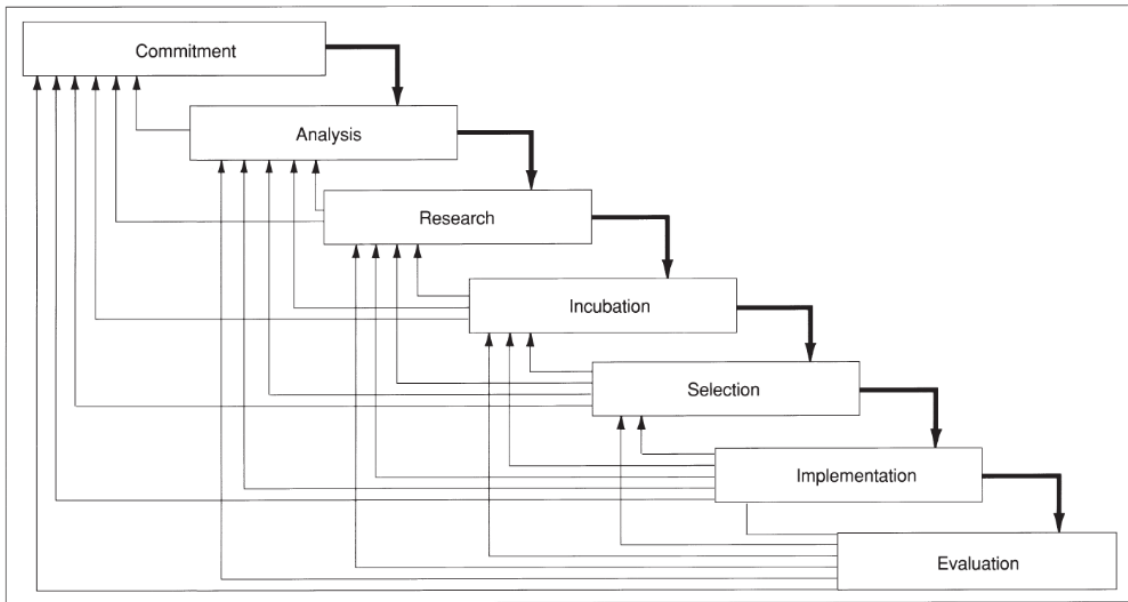


Figure 2: When moving through the design process, the designers check back on all the steps to guide their work. (Gillette)

By starting with committing to the story, the designers understand the challenge and are continuously looking back at this step when moving through the process. Analysis is when the designers read and try to understand these challenges. This step is meant to clarify the story and help identify what needs to be researched in the next level. This is when the designers understand their own emotions in the story as well as how the audience could relate to it. The research phase helps grow the designer's knowledge on the subject as their personal experience is not a good enough frame to make informed design decisions for every story. Incubation is the step where the designer gets to "sleep on it." By giving time to think about the analysis and research, the designer can move onto the selection step with a clear understanding of the potential design concept. In the selection step, the

designer chooses a design concept for the story. For collaboration purposes, this step typically happens in a design meeting with all designers inputting their ideas. Once the design concept has been chosen, the implementation step can begin. For each designer, this step can look different as each designer has different paperwork and information they need to hand over to those who produce the design. At every step, the design team evaluates their work, especially at the end. During the final review, it is essential to evaluate the design concept to understand if it is appropriate for future use.

The questions that this thesis will examine are, can this theatrical design process help create more successful extended reality experiences? Success being more social interaction and long-lasting engagement. Can the focus on human-centric stories make the experiences more engaging? In the last three years, I realized three different XR experiences to help find the answer.

Chapter 2: UNIVERSITY OF TEXAS HALL OF FAME

"I firmly believe we are experiencing a new revolution that will shape every industry you can think of. We should celebrate it" – T.P. Ffiskes

It is no big secret that I am a sports fan, and it's not uncommon for me to be up late working with Sports Center on in the background. It doesn't matter what sport is on I'm probably watching. That being said, one game seems to be on my mind the most. Soccer (or Football as every other country would call it) is by in large my favorite. The game is simple; you have to get a ball in an area more times than the other team to score, the team with the highest score wins. Although it is so simple, it still has led to so many different styles and tactics. I am always mesmerized by how players adapt during a match.

During my time with ESPN, I was able to work on over a hundred different sporting events across the country. I became fascinated by how different teams tried to incorporate audience interaction during gameday events. Many times, this manifested in a prompt for the audience to do something while the cameras would search around, showing different audience members on the big screen in the stadium. Sometimes it was successful, but mostly missed the mark and felt very gimmicky. These observations lead me to my first proposal on what ended up being called the UT Hall of Fame Experience.

STARTING OUT

At the start of the Spring of 2018, I wanted my thesis project to be something that would allow me to work with the sport I love (soccer) while researching the audience's experience during the match. The original project was conceived to determine the feasibility of augmented reality in live sports entertainment. I set out to achieve this by designing a game day experience that will allow fans to interact and observe a University of Texas soccer match in a new way. Fans would be able to use their phones or tablet to see live games and player stats in an augmented reality format.

Initially, I was the only one working on this proposal and I was just thinking of approaching this design in the same way I would have my experiments when I was an Engineer. The design process I utilized was born out of not knowing any other means of thinking.

I felt there was a problem that could be solved by an interactive audience experience that was not gimmicky. If we look at the six steps of the scientific method (define the purpose, construct a hypothesis, test the theory, and collect data, analyze data, draw a conclusion, communicate the results). We can see how I thought this experience should come together based on an engineering mindset. Here is a section from a proposal I wrote up to get this project funding -

Why This Experience:

We are currently living in an era of significant technological advancement. Cars still do not fly, but the world is now going through a rapid rate of technological

breakthroughs that are changing our way of life every day. Entertainment and, more specifically, sports are not immune to this. More clubs are using technology in their day-to-day business and sports operations; FIFA is using goal-line technology and has started experimenting with the use of VAR (video assistant referee) technology to help the game officials. Clubs are trying to engage with fans on social platforms and developing methods to make the matchday experience as interactive as possible. Moving forward, we will see XR technology continue to increase in its use when it comes to entertainment spent. In the past few years, one of these technological advances has been virtual reality (VR) and augmented reality (AR), and it is this project where I propose to use virtual environments in sports as a game-day tool. This use of XR technologies will also open a new level of engagement between the clubs and their fans; it will also open a new revenue stream for the clubs, be it new forms of advertising or in-app purchases.

Why I chose soccer:

To start with, Soccer has been a big part of my life. From playing in my local youth league to playing NAIA DII as an undergraduate and all the way to help my brother start a nonprofit organization (United83) that helps urban kids in Oklahoma play soccer. I truly believe that soccer is a great sport that people of all ages and all around the world can enjoy together. As I have already mentioned, soccer (FIFA) has started to look at how new technologies can help grow the sport towards new viewers. Soccer is becoming one of the most-watched competitions in the US. In a recent Forbes article that broke down the viewership of sports in the US, it stated that "it is very likely that soccer will surpass baseball in this survey the next time such a poll is taken" (Bondy). At the collegiate level,

soccer is not as popular as the game is in the professional realm. Because soccer community is open to changes, this allows for experimentation with fan interaction in ways other sports could not.

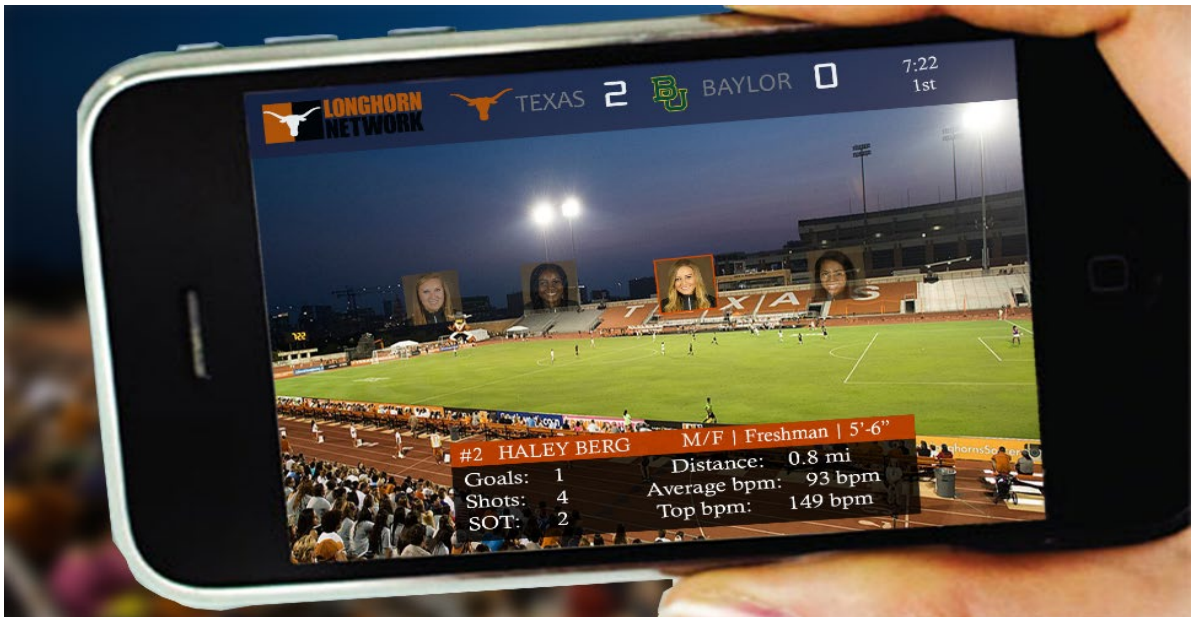


Illustration 6: Mockup of UT Soccer Fan Experience.

While I believed that this experience would have gathered a plethora of data that would be invaluable to our field, the project ran into a multitude of roadblocks—namely getting funding and approval from UT Athletics. They own the rights to allowing research on gameday at UT.

RETHINKING IN AN ADVERTISING MIND

The part of the above design process that was successful was that it got me into a meeting with the Athletic Department. During this meeting, it became clear that they had a different kind of problem they needed me to solve. The problem was that they wanted more people to come to campus during nongame day events and to grow their fanbase from a young demographic. This led me to seek out help with conceptualizing the project as at that time; I was very unaware of advertising design. I was put in contact with Double A Labs to help with this experience. Double A Labs is an international experiential marketing company focused on creating immersive experiences within the entertainment, technology, and gaming verticals. The company has established successful experiential designs for clients such as Warner Brothers, Apple, Dell, Intel, and Blizzard. The CEO, Amber Allen, is also a UT College of Fine Arts Adjunct Professor. Working with Double A Labs and CoFA, we wanted to be able to give multiple different options so that the Athletic department could see what they could get for their investment. The proposal we ended up putting together is the following.

UT Athletics Pitch

Students in the Integrated Media program of the Department of Theatre and Dance within the College of Fine Arts proposed the creation of an immersive, interactive mobile app experience that utilizes augmented reality (AR) to complement and enhance the UT Athletics Hall of Fame exhibit. The app will be designed to encourage younger generations,

like undergrads and prospective students, to engage with the history of UT Athletics in a fun, interactive way, which will foster their sense of pride around being a Longhorn.

CoFA will assemble a team of current UT student artists, designers, and developers to create this experience. However, to guarantee a professional level outcome and to ensure that the student team has the guidance, structural support, and equipment required to succeed, CoFA has partnered with Double A Labs.

Option 1: Timeline through Longhorns History

Create an interactive journey through the history of UT Athletics; printed signs or placards throughout the physical Hall of Fame that can be scanned by fans with a new Hall of Fame mobile application. Once scanned, relevant videos or animations will be triggered onto the phone - imagine reading about the 2006 Rose Bowl victory onsite. Then scanning the sign and unlocking the ability to watch a highlight reel of footage from the game, an animation of the final touchdown right before your eyes, or an interview of a player about that highlighted moment. The app will encourage attendees of the Hall of Fame to interact with all the digital content with a gamified user experience and an exclusive prize (shh it's a 3D dancing Hook 'Em filter you can use anywhere after you've completed the Hall of Fame Quest!). Content is shareable to social media outlets with customized social hashtags to create hype around the Hall of Fame.

Content can be customized depending on the Hall of Fame's needs. Up to 10 scannable images included.



Illustration 7: Mockup of UT Hall of Fame experience option 1.

Option 2: Playing for Bevo (the UT Longhorn Mascot)

Get all the features of Option 1, plus a series of mobile mini-games based off of UT's features sports that are programmed to cycle through some of the most famous plays - are Hall of Fame attendees good enough to replicate the plays? Completing the games unlocks Bevo-based collecting cards with fun stats and stories about each one - play all the mobile mini-games to unlock all the Bevos throughout UT Athletics history.

The critical difference with Option 2 is creating an at-home or on-the-go experience with replayability that still keeps users thinking about UT Athletics and drives people back to the Hall of Fame.

Option 3: "Hi, I'm Matthew McConaughey, and I'll be your guide today."

Work with Matthew McConaughey to bring the UT Hall of Fame to life. Create a combination of visual 3D video capture of Matthew as he serves as a tour guide for the Hall of Fame, calling out the vital content and adding a characteristic flair to the stories that made UT Athletics the institution that it is today. Instead of using standard headphones, partner with Bose to implement their new audio-based Augmented Reality glasses and created a guided experience with Matthews's voice right in your ear. All the visual elements from Option 1 are included.



Illustration 8: Mockup of UT Hall of Fame experience option 3.

WHAT HAPPENED

This project went through a lot of different iterations throughout my involvement with it. Once the proposal was complete, I had to take a step away to allow time for other

projects. For this investigation, it is not essential to look at the outcome but rather at the process I went through in my pursuit to realize this project. During the start, I was more or less working alone: I was brainstorming and coming up with solutions to a problem that I recognized. This process was informed from my time as an engineer; how we would work on experiments during my undergraduate education. While many different experiential designs could be born out of a process like this, it would be challenging to get funding or even the talent that could complete a full XR experience. The lack of collaboration (I was the only designer for the project) and a misunderstanding between all parties involved lead to the Athletics Department wanting something very different.

Once Double A Labs joined in on the project, we started to get headway with funding. As the team I was working with grew, so did the vast amount of valuable ideas that allowed for different ways to pitch the design concept to the client. The biggest drawback with an advertising design process with Double A Labs and myself was the focus on the return on investment. On all our options, we had to plan out the cost adequately and then the expected amount that would come from that option. This directive caused a lot of great ideas that would have helped the athletic department with creating a long-term fan base, to be thrown out. We wanted the experience to be used by a broad, diverse audience. There was a lot of talk on how anyone could come and go through the hall of fame and feel as if there were a part of the UT community. But by going with this mass audience approach, the experience felt stale and lacked connection without a story to immerse the audience.

Chapter 3: Win Reality XR Lab

In August of 2018, while finishing up the UT Athletics project, Sven Ortel (my primary advisor) put me in contact with Chris O'Dowd to work part-time for Chirs's company EON Sports, now known as WIN Reality, as a projection engineer. Sven and I felt like this would be an excellent opportunity for me to explore the field of XR and sports in a professional setting, all the while learning the designers' craft of how to be a compelling storyteller. WIN Reality is now one of the largest VR training companies in the world. They focus on sports training and developing cognitive skills for athletes of all ages. At that time, the main product was a stereoscopic projection cave system. A stereoscopic projection cave is simply a room where the walls are projection surfaces, and the imagery appears three-dimensional with special glasses, just like those used in 3D movie theatres.



Illustration 9: Illustration of the WinR Lab

This XR training system offers baseball players an immersive batting practice experience without the need to have someone pitch a game speed ball to them. The immersive WIN Reality system uses CG (Computer Generated) images, live-action video, and data-driven models. Within the projection Cave, all these technologies combine to create a detailed simulation of an opposing pitcher's performance down to their release point, velocity, and movement of pitches. The experiential design I will focus on for the purpose of this thesis is the WIN Reality XR Lab installed for the Vanderbilt University baseball team.

THE GOAL

After a year of working at Win Reality, the company looked quite different from when I joined. Not only had the name changed, but WIN Reality was now selling the training application on VR headsets. This allowed for a price range that many colleges and training facilities could afford, not just Major League Baseball teams. Although the VR headset version of the application massively outsells the WinR cave, the cave was still seen as a much higher value as it allowed for multiple people to see what was going on in the virtual practice field at the same time. It had the "cool" factor that many sports teams want. For countless top University teams, this "cool" factor was an enormous advantage when recruiting top prospects. In 2019 the superior team was without a doubt Vanderbilt University. With an awe-inspiring regular season, the team went on to win the National Championship in June 2019. That team used WinR VR headsets to train throughout the national tournament. After their Championship season, the University approached WIN Reality about installing a lab to help continue to momentum and attract high profile prospects.

I was brought in to help design how this lab would be installed as the University did not want just a typical install, but instead wanted a rich experience that attracts potential players and to incentivize current players to want to train more. During the research step, it was a challenge to get interviews of coaches and players during the offseason. Eventually, I was able to gather enough information to move on. These meetings ended up being extremely valuable for the overall design of the experience. During these conversations, it became evident that the players were extremely competitive, especially

towards each other. Almost all of the players brought up how they enjoyed playing Fortnite against each other in the players' lounge. They also talked a lot about being proud of their schools' colors, black, and gold.

With a good grasp on what motivates the players, I started to work with a 3d artist to mock up the space in different designs. We modeled the room in Vectorworks first so that we would have an accurate model to start with. We then took the model into Cinema 4D to put textures onto the model and make the lighting look realistic.



Illustration 10: Mockup of the room before we installed it.

Once we had a 3d model of the room, we added the Win Reality projection cave into that space to see what we had left to work with. The lab took up about two-thirds of the room. One of the other design considerations was the paint treatment on the walls and the ceiling. We wanted a simplistic look, so we decided to take out the carpet and clean the

concrete underneath it. We ended up with three different options (similar to the UT Hall of Fame proposal) to show the University. This allowed them to pick what they wanted. They ended up choosing a few things out of each design concept.

It became clear that we needed to add another element to the experience that would allow the players to stay competitive. We knew that it would not be enough just to enable the players to see themselves go through the experience. After a discussion with the developers at WIN Reality, we decided on adding a monitor that would show a leaderboard of all the Vanderbilt players once they finished the XR training. Once all our designs were signed off, we moved into getting all the materials sent to Nashville to start installing. As we only had a week to install the whole experience, we needed to make sure that everything was there and ready to go.



Illustration 11: Mockup of the Vanderbilt room



Illustration 12: Mockup of WinR lab in the Vanderbilt room.

THE INSTALL

Knowing that we had a short time to install an extensive experience, I reached out to my friend Chris Conard. Chris had a vast knowledge of theatrical show installation and carpentry. I saw these skills as being invaluable during the install. We were up against a very tight timeframe and needed to be flexible; the clients were already changing their minds on a few design elements. When we arrived in Nashville, we got right to work and found that the floor was going to take a lot more work than we anticipated. This forced us to rethink putting a gigantic logo on the center of the floor as we believed it would not stay.



Illustration 13: Mockup of the Vanderbilt room

Another issue we encountered was a fire sprinkler that was not accounted for in our original mockups. We needed to move the lab into the center of the room about 6 inches, so one of the projectors could be hung in the correct location. These setbacks put us a little behind schedule but are great examples of how flexibility in design can allow installations to be installed into multiple locations. After a week of hard work, we ended up handing the "keys" over to the hitting coach for the final check and walked them through the operation process.



Illustration 14: Final test of the WinR Lab at Vanderbilt.



Illustration 15: Image of the back of the WinR Lab at Vanderbilt

ADAPTATION IS KEY

At the start of the design process, we quickly identified that our primary goal was to incentivize the repeated use of the installation by the players and coaches. Working with game developers from WIN Reality, and after identifying our primary goal, we decided to implement a standard game design process to realize this project. The steps this process include are; capture, brainstorm, prototype, playtest, iterate, and implement. (*Game Design Process*)

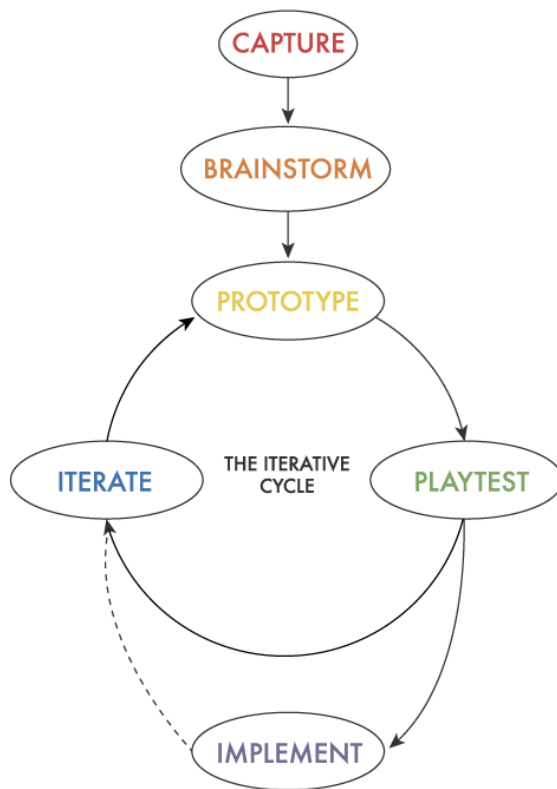


Figure 3: Image of Game Design Ed's game design process.

Within the capture stage, we worked with the university to understand what they wanted. During the brainstorming phase, we got together with the whole WIN Reality team to figure out the best solutions for their needs. A big part of what made this design process successful is that I sought out collaborators with skillsets that I do not have. Building a strong team with relevant knowledge is the job of the director or, more likely, the producer in the theatrical environment. For our prototype, we stuck with a digital form that allowed for changes to be made quickly and allowed for the playtest to take place in a digital form with digital walkthroughs. Even during the implementation phase of this experience, we had many different iterations that happened.

Chapter 4: UT Admissions Experience

In the Fall of 2019, I decided to take a class through the School of Advertising called Experimental Storytelling taught by Erin Reilly in the hopes that the course could help me understand and develop ways of telling stories using XR. The course is designed to explore XR worlds and to create an immersive story experience as a final project. Using design thinking and human-computer interaction, the class set out to create a human-centric experience for The University of Texas Admissions Center. As a class, we were given a prompt from the head of admissions for the experience – "Tell the story of what it is like to be a longhorn and live on campus, immersed in the UT Austin academic experience, long-lasting traditions, and history. Help prospective students envision campus life and experiences to be able to make the right choice for themselves starting from the day they receive the letter, taking the tour, and returning home followed up with a thank you email."

THE BIG TEAM

Once we were given the prompt, we decided to appoint four students to a creative direction team; I was included on this team. The goal of this group was to oversee the design process with a view toward cohesive storytelling. We wanted a XR experience to be in every aspect of a prospective student's visit to campus. This goal led us to research what UT admissions does when potential students visit. After interviewing staff members, we identified a few different areas that a cohesive XR experiential design could live in:

getting information to a prospective student before a visit, the welcome center, the campus tour, and interacting with potential students after a visit. Before creating any storyline, my creative direction team separated our other classmates into three different groups that could help organize these various installations. The teams were given these names: *before-and-after*, *welcome center*, and the *tour*. Within each of these teams, we had one leader who oversaw the group and acted as the primary contact for the creative directors. With all the teams set, we all got together to select an overview of the design concept. The creative team gave the class a simple storyline of "see yourself in Austin." We wanted the prospective students to feel like they could be a part of the extensive community that is UT Austin.

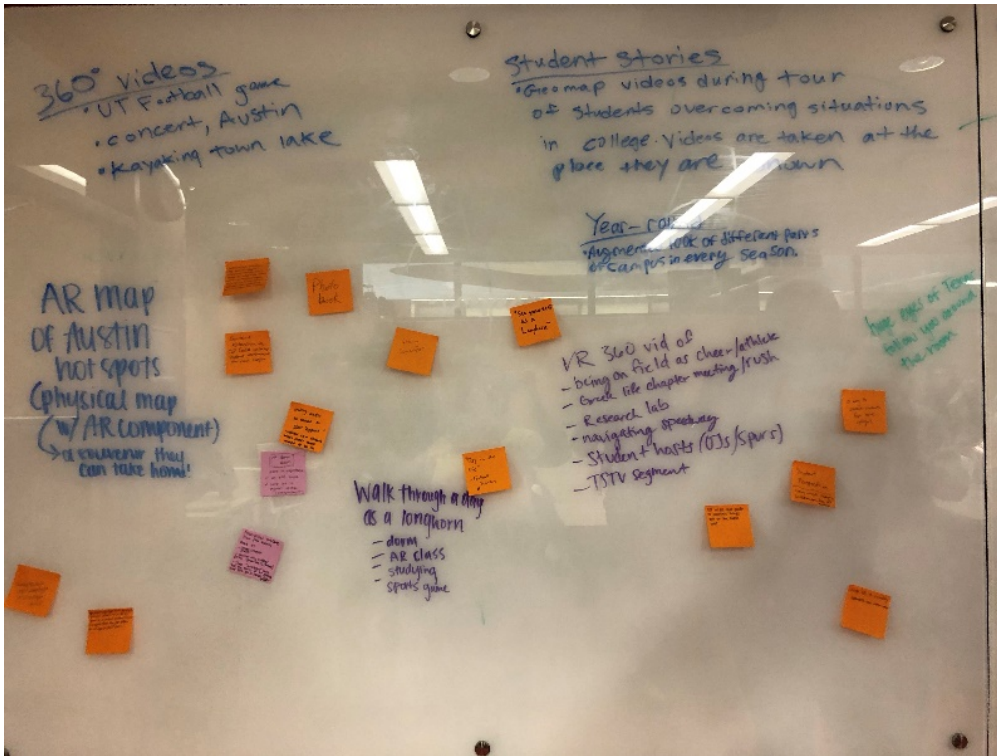


Illustration 16: Our first brainstorming session.

The thrust of our design concept centered on providing our audience something tangible to base our story on. This physical object was the center of the story. We felt it was essential for the users to connect to the story on a physical level. We wanted these prospective students to connect to Austin as a whole. By focusing on the single storyline of "see yourself in Austin" we put together a plan to tie in all of the different activities that a prospective student can do within the experience.

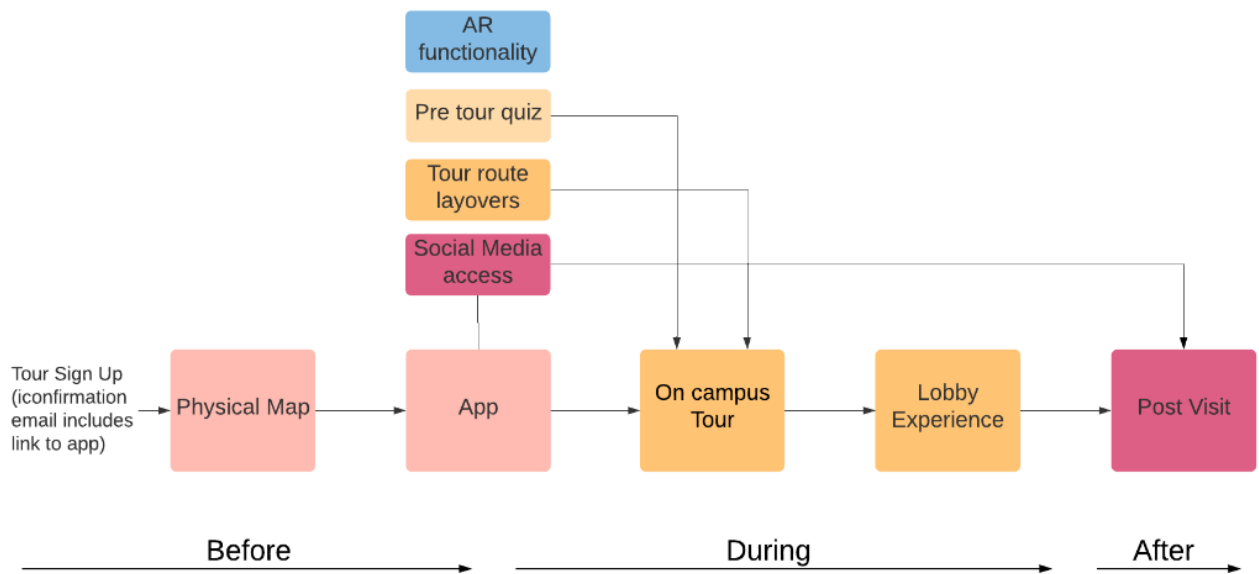


Figure 4: A flow chart of our original user experience design.

The physical object was handed over to the *before and after* team to design. The group decided that a physical map that the users could interact with through AR was the best approach. This tangible map allowed the user to connect to the story in a way a purely virtual object couldn't. The AR element was intended to highlight attractive aspects of the university by featuring locations and stories that embody Student Life at UT, through the eyes of current students.

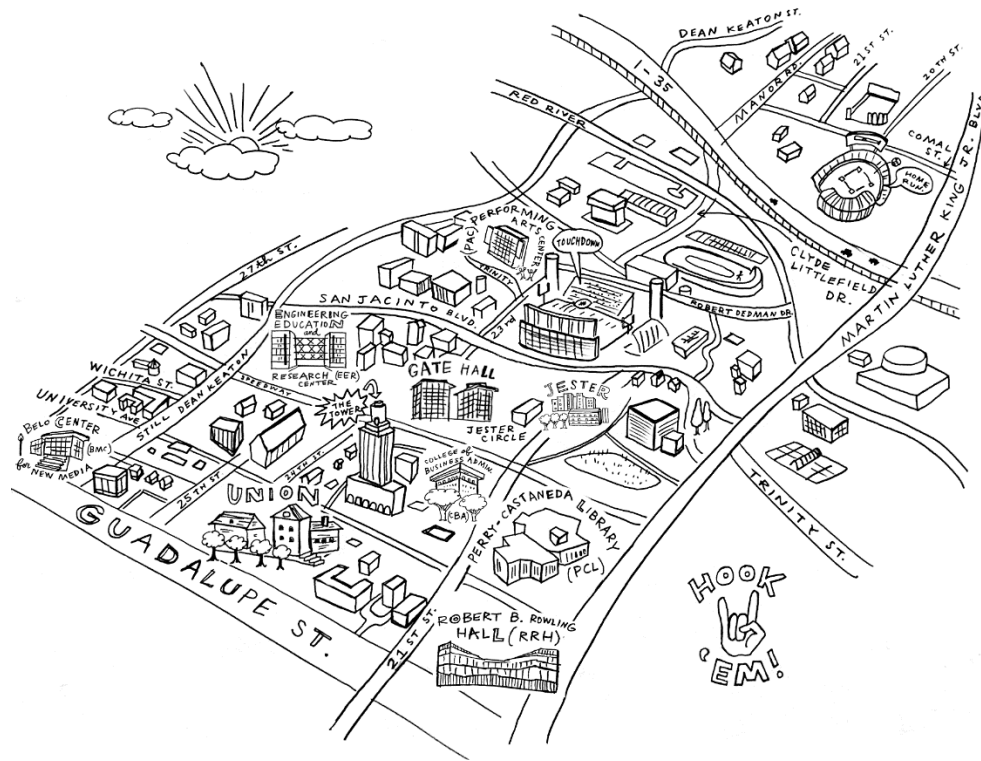


Illustration 17: Design for the UT map that would have AR elements added to it.

Created by Rohitash Rao

As the *before and after* team was working on the AR map, the *welcome center* team worked on the element that would go in the lobby and play a part of the "see yourself in Austin" story. This team decided they needed to use elements of the physical map and create ways for the prospective students to see what it would be like in those areas. First, they sought to develop an AR photo booth that would take pictures of the prospective students with different mascots that can be found on the real map. The second idea was to create a VR movie that allowed the user to experience the atmosphere of UT. We showed locations that prospective students would not be permitted into during a visit day (class

time, the student section at a football game, and in the gyms). For both of these projects, I ended up stepping in to help with some of the technical implementation. The photo booth was prototyped with a program called Touchdesigner on a sizable 50in touch screen TV. The filmed 360 VR experience was created using an LG 360 camera and shown off on an Oculus Go.



Illustration 18: Showing off the prototype for the AR photo booth.



Illustration 19: Testing out the VR film for UT Admissions.

The *tour* team started with customizing the existing tours to what the prospective students on the trips would wish to see. This led the team to create a digital quiz that the prospective students could take to determine where on campus they would most likely be if they attended the university. After some play-through and interviews with the admissions staff, we found that this would be hard to implement as there are sometimes over 50 perspectives taking the tour at one time. Looping back a step in the design process, the team chose to focus on an AR experience that could synchronize with the existing tour but

also work as a standalone experience. This AR experience would become a type of scavenger hunt that the users could go out and find different mascots, and watch videos of people talking about what life is like on campus. You would be able to find hints on the physical map that the *before and after* team created. We also wanted the experience to be easily accessible, so we decided to develop a scavenger hunt prototype using a web-based AR application called 8th Wall. Doing this allowed anyone with a smartphone to join the scavenger hunt without having to download an app.



Illustration 20: Hook 'em Helper became the main mascot of our experience. Created by Rohitash Rao

CONTINUING EFFORT

After a full semester of working on this project, we were able to pitch the whole experience to UT Admissions. We were able to show off all the prototypes and our mockups for them to try. The goal of this presentation was to get Admissions excited about the story and our design so they would provide funding to produce the experience at full

scale. The main elements we showed off were the physical map with AR elements embedded onto it, the AR photo booth, and the VR 360 video.



Illustration 21: Presenting our final design to UT Admissions.

After a few months, we got word that UT Admissions would be continuing our funding and allow for further development of this experiential design.

One of the reasons this experiential design was successful in garnering future funding was the collaborative team structure. By mimicking teams from traditional theatrical design, we were to create a team structure that allowed us to stay focused on the story we wanted to tell while still using XR technologies.

Chapter 5: The Conclusion

At the start of this research, I set out to answer two questions: Can the theatrical design process help to create more successful XR experiences? Can the focus on humancentric stories make the experiences more engaging? All three of these experiences had different end goals, employed different design processes, and all utilized stories to help achieve their objectives.

With the UT Athletic hall of fame experience, the story started by being about the athletes and the fans. When the intention changed, the story also had to change. The new story was about the legacy of the UT Athletic Department. At the start of the design, with no clearly defined process, I was focused on crafting an experience without collaborators. This caused a problem with obtaining funding as I was designing a solution to a problem that the client was not focused on. Once I brought on collaborators, we were able to create a design concept that the client wanted. Unfortunately, by solely focusing on the return on investment, we faltered during the implementation phase due to the fact that our storyline had been diluted.

During the design for the Win Reality lab for Vanderbilt University, I was able to bring together a team of collaborators to stay focused on the end goal of repeated engagement with the XR cave. I used a game design process to identify and build the story for the installation proposal. One of the keys to success on this project was the ability to adapt late in the installation process and still stay true to the original design and story. This adaptation is prevalent in the theatre design process.

For the UT Admissions experience, the cohort that was put together not only came with a vast amount of expertise, but I was also able to place the group into smaller teams following a theatrical design structure. This framework fostered better collaboration, developed the concept of "see yourself in Austin," and allowed the group to focus on a character for a through-line in the story.

THE DESIGN PROCESS FOR XR

As stated on page 11, all design processes have roughly the same steps. That being:

1. Commitment
2. Analysis
3. Research
4. Incubation
5. Selection
6. Implementation
7. Evaluation

All three of my projects went through each of these steps with very different outcomes. By working on the design of these three different experiences, I have grown as a designer and realized which way that I prefer to design.

Collaboration is crucial to the way we should be thinking about experiential design when using XR technologies. It is prudent to start full collaboration from step one. This

allows for the team to fully understand what the goal is and how to garner funding. During the research and brainstorming steps, having a diverse and robust design team creates more ideas that can lead to a better experience for the end-user / audience. Many times, those of us that have been using the tech for a while forget that many people still have not used any XR technologies. By having a team that thinks in different ways, this can mitigate the risk of having an experience that is too complicated for novice users.

The next vital aspect to keep in mind when designing these experiences is the story that one is trying to convey. By focusing on the story, one can always refer back to it and determine if what one is adding to the XR experience helps with the goal. I have found that creating a tangible character helps with the storytelling and allows the user to feel comfortable in the XR tech. This character does not need to be a traditional character. In the UT Admissions experience, we designated the map to be a character in our story. We considered the map a character because it had a dialogue with the users and continued the story as the experience progressed. Treating the map as a character helped achieve the end goal of experiencing life in the UT community.

The last key that I have found is to allow for changes during the installation/implementation phase. When working with XR tech, there needs to be an understanding that things do not always work as planned. When starting the installation and testing, designers should be aware of issues that might come up and have a strong work ethic to be able to fix the problems even on short notice.

Collaboration, focus on the story, and flexibility are all core mentalities prevalent in a theatrical designer. This thesis is the way that I have found to respond and think about

successful XR experiential design. Being informed through these three different experiences, I have grown as a designer and realized I prefer the collaborative theatrical design process for creating XR experiences. All three of these experiences had different end goals, but by focusing on human-centered design and story, they achieved a higher level of social interaction and long-lasting engagement. This design process I discovered for myself for XR experiences is not the final iteration but a beginning.

THE GLOBAL CHANGE

"Humanity is at the brink of a global change; digital living in extended reality is becoming the norm in the United States."

December 23, 2019, is when I wrote this sentence as an opening line for my thesis. Now, three months later, in the middle of the COVID-19 pandemic, these words are more prudent than they were back then. When I imagined a mass shift to a digital world, I never thought it would happen before I finished writing this paper. Americans are now working at home and communicating through digital worlds. Social distancing is now a household term that is taking over all talking points in our media. With this in mind, the research I compiled over the last three years is more crucial now than ever before. As a society, we need to understand how we tell stories better with XR technologies.

The concept of the community moving to digital interactions is not a new one. Classics like Isaac Asimov's 1950 book *I, Robot*, and Laurence Manning's 1933 series of short stories, "The Man Who Awoke," both look at how culture might change in a more computer-centric world. Even movies such as the 1983 film *Brainstorm* and the 1990 film

Total Recall showed what a future might look like with XR technologies. Dr. Edward Castronova, in his book *Exodus to the Virtual World*, written in 2007, not only states that this shift is upon us but breaks down the gravity of this situation.

The exodus of these people from the real world, from our normal daily life of living rooms, cubicles, and shopping malls, will create a change in social climate that makes global warming look like a tempest in a teacup.

This is a dramatic statement, but it still highlights the significance of such a global transformation. With the current global upheaval, XR technologies are becoming more and more needed. It becomes imperative that we are creating XR experiences with a thought out design process that is centered on collaboration and human-centric storytelling.

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