Design, Programming, and User-Experience

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DESIGN, PROGRAMMING, & USER-EXPERIENCE
A BACHELOR OF SCIENCE THESIS IN HUMAN-COMPUTER INTERACTION
ABSTRACT

This thesis is a culmination of my individualized major in Human-Computer Interaction. As such, it showcases my knowledge of design, computer engineering, user-experience research, and puts into practice my background in psychology, communications, and neuroscience.

I provided full-service design and development for a web application to be used by the Digital Media and Design Department and their students. This process involved several iterations of user-experience research, testing, concepting, branding and strategy, ideation, and design. It lead to two products.

The first product is full-scale development and optimization of the web application. The web application adheres to best practices. It was built to be responsive, SEO-friendly, accessible, and it utilizes current methods for web development.

The second product is this accompanying thesis document outlining the history of user-experience design, as well as current research in user-experience design and user-interface design (psychologically and historically-based), supporting my reasoning and process.

In addition to these final documents, there were several “process-based” markers of my work, including a thesis timeline and process outline, traditional documentation of my UX process, the results and analysis for my testing, and images and descriptions of the final web app. These accompanying documents are included with my final thesis.

Throughout the process of creating these products, I provide a comprehensive overview of today’s standards for a user-experience focused web design and development process. My work aptly represents the knowledge I’ve gained throughout the past four years of study in the UConn Individualized major program. The process outlined in this thesis project is typical in a user-experience, design, or development career, and will be an asset as I enter the work force in this field.
INTRODUCTION

THE HISTORY OF USER EXPERIENCE

User experience design has developed partially because of the evolution of research in industrial design and human factored design, but also because of the advent of technology. In order to thoroughly understand the field, a history of technology, ergonomics, and other relevant design principles is also necessary.

COMPUTERS AND COMPUTING

User experience designers utilize technology as their tool for design. Therefore, the advent of the computer has allowed this industry to blossom. A brief history of computers and computing theory is essential in understanding the evolution of the user-experience field. Thus, I’d like to highlight some key advancements to technology that have brought the technical world to its current fortitude.

The world’s “first computers” or computational devices were abacuses, which were created around 2400 BC. There were many of these devices—“on paper” computers, that were created before any major breakthroughs in computing, but that is outside the scope of this article. For all intensive purposes, I will discuss only the technological advancements made after the early 19th century. This is when the first general-purpose computing device was developed. (Spraul, Anton, “Computer Science Made Simple”)

Charles Babbage was an engineer and mathematician in England during the early 1800’s. He was the first to come up with the concept for a mechanical computer. The input to the device was given through punch cards, and the output could be provided by a printer, written numbers, a bell, or a curve plotter. In computer science, it was the first device to incorporate an arithmetic logic unit (ALU), control flow via loops and conditional branching, and integrated memory. This also made it Turing-Complete, a term named after another father of computer science, who will be discussed later in this brief history. (Spraul, Anton, “Computer Science Made Simple”)

During the 1900’s analog computers were invented, and grew to relative sophistication. Analog computers use a direct electrical or mechanical model of the problem in order to compute the output. The first of these was invented by Sir William Thomson in 1872, though James Thomson, H.L. Hazen and Vannevar Bush made their own contributions to the analog computing world. These analog systems were impressive for the time, yet they were ultimately rendered obsolete by digital computing. (Spraul, Anton, “Computer Science Made Simple”)

One of the first major modern breakthroughs in computing was made by Alan Turing. In 1936, he wrote and published On Computable Numbers, a paper in which he proved an algorithmic basis for computing and introduced the Turing machine. In essence, he created the first theoretical computer. During the Second World War, Alan was working for the Government Code and Cypher School, at Bletchley Park in Britain. He was hired to break German coded messages, and subsequently developed major advancements to their machine technology. After the war, he worked for the National Physical Laboratory, where he designed the ACE (the Automatic Computing Engine), an early electronic stored-program computer design. (Spraul, Anton, “Computer Science Made Simple”)

Early digital computers were electromechanical—electric switches drove the calculations, which contrasts the much-faster vacuum tube design that we used years later. The Z2 and Z3 were first models of these types of computers, the Z3 representing a complete Turing machine design. (Spraul, Anton, “Computer Science Made Simple”)

This new and innovative vacuum tube design was engineered by Tommy Flowers, who also converted telephone networks in the U.S. to the same type of efficient tube design. Flowers was commissioned by the Navy to create an advanced version of Enigma, the computing device Turing had worked on. They called it Colossus—the first electronic digital programmable computer. It was built to crack German codes, specifically the German Lorenz SZ 40/42 machine. Colossus was capable of utilizing boolean logic, but it was not Turing-complete.

ENIAC (Electronic Numerical Integrator and Computer) was begun in 1943, and was completed in 1945. In the United State’s first electronic programmable computer, and it was much faster, more flexible, and versatile than the Colossus. It was Turing complete, could compute any problem that was stored in its memory. Its memory was programmed by setting it into the machine mechanically, which now (in 2016) seems tedious and inefficient. The machine also weighed 30 tons, and had hundreds of thousands of parts and circuits. (Spraul, Anton, “Computer Science Made Simple”)

In 1945 Turing continued to make his mark on the computer science field with his paper, the Proposed Electronic Calculator. The innovative and unique part to his design was that it implemented stored-program digital computing, so that memory would be electronically manipulated and not mechanically entered.

Such a device (the SSEM, or Small-Scale Experimental Machine) was built at the Victoria University of Manchester in 1948. It was considered the first machine to contain all the essential parts included in a modern electronic computer. As soon as
the concept was rendered feasible, a project was initiated to create a more advanced version—the Manchester Mark 1 (Spraul, Anton, “Computer Science Made Simple”).

The Mark 1 initiated the Ferranti Mark 1, the world’s first commercially available computer. Many more of these machines were developed and used, but computers were not yet mass-produced or marketed. By this time, large companies like HP (Hewlett-Packard) and Intel existed and were either interested in the field of computing, or already experimenting with it (Gladwell, “Outliers” 212).

There were still improvements to be made, and the industry moved quickly. In 1947, transistors replaced vacuum tubes. However, soon afterwards, the SEAC (Standards Eastern Automatic Computer) was created in Washington. It implemented all-diode logic. Soon, (in 1952) transistors were replaced with integrated circuits. (Seel, “Digital Universe”).

1951 was a big year for computing—the UNIVAC I was a commercial computer delivered to the U.S. Census Bureau, and as such, became the first computer to attract widespread public attention. The company that manufactured that model, Remington Rand, eventually sold 46 machines at over $1 million dollars each. (Seel, “Digital Universe”)

In 1953, IBM ships its first electronic computer, the 701. In three years of the 701’s production, nineteen are sold to research labs, aircraft companies, and the federal government. Personal computing at this point still had yet to catch on. With the IBM 650, developed in 1954, the company finally began mass-producing computers. (Isaacs, “Steve Jobs”).

Through the next few years, IBM continues to create new models of computers—now transistorized, and the world sees the development of the first computer network. In 1961, the year IBM released the 1400 series, Datamation magazine reported that IBM had 81.2% of the computer market. 12,000 of these computers were sold, making a case for general usage of computers amongst the public consumer market. This foreshadows the success of personal computing that comes years later (Spraul, Anton, “Computer Science Made Simple”).

IBM follows this success with the announcement of the System/360 in 1964, a computer system utilizing integrated circuits. Orders were made for these computing systems to the degree of 1,000 per month within two years. This also marked the transition from punch card systems to digital computing. (Spraul, Anton, “Computer Science Made Simple”).

In 1965, IBM experienced competition from Digital Equipment Corp., who manufactured the PDP-8, the first commercially successful microcomputer. It was sold for $18,000 per unit, much cheaper than the IBM 360, and quite fast in comparison.

Hewlett-Packard also enters the industry in 1966 with the HP-2115. Their version of computer offered more power than the other models, and supported several languages, including BASIC, ALGOL, and FORTRAN. (Spraul, Anton, “Computer Science Made Simple”).

In 1965, Gordon Moore, the co-founder of Intel, made a prediction that would help computers rapidly advance. Moore forecasted that the number of transistors per square inch on integrated circuits had doubled every year since its invention, and stated that this would continue for many years, until it was physically impossible to make smaller computing devices. He expected to see dramatic (exponential) increases in power along with decreases in cost for computing. This is exactly what has happened as we trace the history of these technologies. (Schmidt, Cohen, “The New Digital Age”)

Through the beginning of the 1970’s personal computers were debuted and advertised in order to breach the consumer market. In 1968, the Nova was created (32 KB memory, valued at $8,000), and the Apollo Guidance Computer orbited the earth on Apollo 7. In 1971, the Kenbak-1, the first “personal computer” was advertised for a mere $750 in Scientific American. Up until this point, though computers were targeted to the public market, they were not financially appealing to the everyday consumer. The decrease in computing costs eventually allowed companies to drop costs for devices, making computers publicly available, rather than commercially based. Unfortunately, the Kenbak itself was not user-friendly, and lacked an attractive design, and only 40 machines were sold. Kenbak Corp. closed its doors. (Seel, “Digital Universe”)

HP continues to develop new devices, and new technology is introduced in 1973. Specifically, the TV Typewriter, by Don Lancaster, provides the first display of content (alphanumeric information) on a television set monitor. This concept of using a display for the computing device is a huge development in computer science. At the same time, Thi Truong developed the first micro-processor based computer. (Spraul, Anton, “Computer Science Made Simple”).

These two major developments come into fruition in 1974 at the Xerox Palo Alto Research Center. They create and present their design—the “Alto,” which incorporates a mouse, keyboard, and monitor. It’s the first of the historical breed of computers that actually resembles the device we know and love today. The Alto was capable of tying into nearby networks, storing files, and provided a capable user-interface involving menus and icons. It was never sold commercially, but it was the starting point for the designs of computers we know today. (Schmidt, Cohen, “The New
The Alto also inspired the next large player in the computer science industry—Steve Wozniak, and his partner—Steve Jobs. Wozniak designs the Apple-1, a single-board computer for hobbyists, and he and Jobs follow up a year later with a ready-to-use out-of-the-box computer for the everyday consumer, the Apple II. Competing models from Atari, Radio Shack, Apollo Computer and Sun Microsystems, and independent inventors continue to crop up. The most notable of these is IBM’s PC, introduced in 1981 and igniting the personal computing industry. (Isaacson, “Steve Jobs”).

With Apple’s “Lisa,” introduced in 1983, the industry shifted towards graphical user interfaces. Though the Lisa itself is considered a market failure, it did introduce new design strategies and visual components for the computer industry. Compaq Computer Corp introduced their version of the PC this year, which was a commercial success at $111 million. (Isaacson, “Steve Jobs”).

In 1984, Apple releases the Macintosh, which utilizes the graphic interface from Lisa, a mouse-driven system, with better processing power and a cost-effective price. The Macintosh was a commercial success. (Isaacson, “Steve Jobs”).

Through the end of the 80’s, computing saw the introduction of floppy discs, operating systems, mouse-driven computing interfaces, optical storage disks, built-in digital signal processors that allow voice-recognition, and object-oriented programming languages. (Seel, “Digital Universe”)

Here marks the emergence of modern day media and computing systems that look recognizable in the modern day. Here also begins the most important part of the history from a user-experience perspective.

**THE EMERGENCE OF NETWORKS AND DIGITAL COMMUNICATIONS**

In the 1960’s, the US Department of Defense funded an ARPA (The U.S. Advanced Research Projects Agency) project called ARAPANET (The Advanced Research Projects Agency Network), a packet switching network built to share research data worldwide. ARAPANET is considered to be the original basis for today’s internet. The term “internet” was adopted in December 1974, as a combination of inter and networking. (Tanenbaum, “Computer Networks”)

In 1980, Tim Berners-Lee built ENQUIRE, a database of people and software models that rendered each piece of data in a webpage. This fueled his burgeoning interest in worldwide access to information, and in March 1989, he wrote a proposal for “a large hypertext database with typed links” (Berners-Lee, “Weaving the Web”).

Though the proposal was not supported, Berners-Lee began building his idea on a NeXT workstation, and named it the World Wide Web. In order for it to work, Berners-Lee had to establish HTTP (Hypertext transfer protocol), HTML (Hypertext Markup Language) and the first web browser and web pages. This development marks the beginning of the world wide web. (Gladwell, “Outliers”;

GROWTH AND EXPANSION

After the World Wide Web was initiated in 1989, the first website was launched in 1990. With the advent of Windows 95 operating system in 1995, the American public became aware of the existence of this new technology. However, the majority of people didn’t begin using internet until around 1997/1998. Computers themselves weren’t considered to be popularly used until 1995. However, once adoption began, it’s been impossible to stop. (Spraul, Anton, “Computer Science Made Simple;” Seel, “Digital Universe”)

In 1984, the internet originally linked 1,000 hosts at universities and corporate labs. Within just a few years of expanding outside this domain, it grew to 50 million users, as reported in a 1998 study. By 2009, there were 1 billion users of the internet, and 440 million hosts; by 2013, the internet population reached 2.7 billion people, or 39% of the world’s population. (Gladwell, “Outliers”)

The number of websites has grown exponentially: from zero, to 130 in 1993, to 100,000 in 1996, to 634 million in 2012. That number is over 930 million today (2014). (W3C, “Internet Live Statistics”)

Meanwhile, in order to parse this unbelievable amount of data, search has grown to be a huge industry. Google, the leading search engine, was founded on September 4, 1998, and started with around 9,800 queries/day in 1998. In 2012, that number rose to 3 billion per day, 1.2 trillion annually (Google, “Our History In-Depth”).

Use of the internet has influenced commerce and communication, culture and communities. Advancements in Email, instant messaging, VoIP two-way video calling, and social media have paved the way for a new type of human communication (Seel, “Digital Universe”).

**SOCIAL MEDIA COMMUNICATION**
The use of social media was birthed through the rise of the world wide web. Though there were many concepts for social media sites, with varying success (ahem, MySpace), the first to experience widespread adoption was Facebook. Facebook was launched in 2004, and grew to 200 million users by 2009. By 2012, Facebook had reached more than a billion users. Moreover, these users were actively engaged in the site—7 billion pieces of content were shared weekly, and 300 million photos were added every single day. (Who Is Hosting This Blog, “The Incredible Growth of Web Usage”)

YouTube, a popular video sharing site, was launched in 2005 and reached 1 billion daily video views in 2009. As of 2013, the site records 1 billion users monthly, who watch a whopping 48+ hours of videos per month, and upload 72 hours of video per minute. (Who Is Hosting This Blog, “The Incredible Growth of Web Usage”)

Twitter was launched in 2006, two years after Facebook. In 2012, Twitter had 200 million users, though it still doesn’t have the widespread diffusion rate of Facebook. The same is true with Instagram and Google+. (Who Is Hosting This Blog, “The Incredible Growth of Web Usage”)

LinkedIn, the first networking and career-focused social media platform, was launched in 2003, and beat out Twitter with over 200 million users in 2013. Further, LinkedIn claims that 2 new users join their platform every second. (Who Is Hosting This Blog, “The Incredible Growth of Web Usage”)

Pinterest, a late player to the social media game, offers a search platform for browsing via images. It was founded in 2010, and experienced an impressive growth curve. After gaining only 200 users after the first four months (2010), Pinterest grew a whopping 286% to more than 20 million unique visitors in 2012. In 2013, that number grew to 48.7 million users. (Who Is Hosting This Blog, “The Incredible Growth of Web Usage”)

All of these companies were developed based on a mobile app or website, which offers an incredible entrepreneurial opportunity. The cost to create one of these products is incredibly low, and yet the reward for these companies has been exponential. The first company to set this precedent that “two guys in their garage can start a company” was Apple Computer. Steve Jobs and Wozniak built the company, and forever defined the standard “passionate, college-aged founders”. No company has been more renowned for their innovation and user-experience design. (Isaacs-son, “Steve Jobs”).

Twitter, a company that was founded by a similar crew, and does not by itself generate user-based income (excluding advertising and data-collection) was recently valued at $38 billion according to Forbes. The speed of potential success involved with this type of company has given rise to a “start-up” mentality and culture surrounding the current tech community. Indeed, the mindset from the 1999-2001 “Dot com” boom and bust has carried forward, though in a more reserved manner, into the 21st century. (Stone, “The Everything Store”). All the companies I’ve discussed were engineered after the bust.

This rise in social media use has caused a continuous cycle with our current dependence on mobile computing. Mobile phones have brought popularity to these companies that develop a successful app platform, and in return these apps keep us tied to our pocket-sized devices. Today, we have 6.8 billion mobile subscriptions, 2.1 of those for mobile broadband. (Seel, “Digital Universe”) As expected, this provides a significant challenge for web designers and developers. Now, we develop apps as well as web pages. We must build our sites to look presentable and work on any device, not just a computer screen. “Responsive Web Design” is the phrase we’ve used to describe this approach. This is just one of many adjustments designers have had to make when working with the web as a medium. Backtracking just a bit, I’d like to briefly discuss some other monumental changes in web design from the 1990’s to today.

THE EVOLUTION OF WEB DESIGN

When humans first invent new tools, we experiment with their possibilities. Often, we err on the side of providing too much information, giving too many options. This is especially true when we are unfamiliar with the capacities and capabilities of our medium. An artist painting in acrylic, but used to watercolors, will make many mistakes. He may not use the paints and his supplies to their fullest extent, or he may try to make them behave more like watercolors might.

With the fast-paced advancement of technology, designers and developers alike were thrust into this decade of learning new tools with which to practice their trade. Subsequently, web design has undergone many distinct changes since the advent of the world wide web.

Initially, developers were the ones in charge of delivering online content in every way—the visual representation of a site would be a function of the programmer’s skill and choices for the visual layout. Additionally, the web was a new and exciting tool, and there were many options available for styling it. Subsequently, websites often ended up trying to do too much. (See Figure 1)
Even sites that are still familiar to us today had a much different look in their early days.
Over time, it became apparent that design was an important element of a website that was being overlooked. Further, it grew more important to present well online, because online presence was an increasingly crucial factor in establishing any company. By 1996, it became apparent to most publicly traded companies that a public Web presence was no longer optional (FROON'T, "History of Web Design for Designers"). Finally, technology presented designers with new tools with which to interact with the web and its public face—namely Apple computers and their graphic interfaces, new and more powerful printers, and new software and applications like the Adobe Creative Suite.

Design freedom also came through a few more year’s time. In the 1990’s, all websites were created by using tables (the trend of putting tables within tables to mix static cells with fluid cells was popularized by David Siegel’s book “Creating Killer Sites”) (FROON'T, “History of Web Design for Designers”). With the advent of new programming languages, this method became obsolete. CSS3 (Cascading Style Sheets, invented in 1998), now styles most web pages, and is the current standard along with the HTML5 markup language. Instead of using antiquated tools like Adobe Flash (which was famously denounced by Steve Jobs through his refusal to support it on the iPhone in 2007 (Isaacson, “Steve Jobs”)), developers are now capable of utilizing script languages like JavaScript to provide interactivity and animation to static pages (JavaScript was invented in 1995 http://blog.froont.com/brief-history-of-web-design-for-designers/). Further, the invention of jQuery, by John Resig, greatly simplified the JavaScript language, allowed Ajax support, and made development more painless. (JScripters, “jQuery” ) Today, JavaScript is generally avoided for direct use, but it provides a strong backbone for front-end development through jQuery and back-end development through tools like Node.js. (FROON'T, “History of Web Design for Designers”). Currently, grids and frameworks are also essential tools for web designers, that make it easier to implement designs faster than ever before. The use of grids and frameworks started to become popular in 2007. Frameworks also assist in responsive design, taking the brunt of the tedious and repetitive work off the shoulders of the developer. (Medium, “History of UX Design”)

Each of these innovations individually work towards creating freedom of design—instead of being limited to the tables of past, designers are capable of creating almost anything within the bounds of a browser window. Yet along with that freedom, it’s become apparent that the past days of “overdoing it” were not the best at impacting user-experience. As of around 2010, flat design started to become popular, so web designers started streamlining content and ditching the extra “shadow” effects and fancy (unreadable) type (FROON'T, “History of Web Design for Designers”). Designers realized that the core principles of graphic design still apply. A strong layout and design structure, along with poignant type choices remain relevant (and arguably essential) in online media. In simplifying visual elements, we put more thought into copy, more visuals for the user to appreciate, and more thought into the layout. Plus, users have an easier time navigating online spaces when there are less elements competing for attention, or so usability tests have shown (Krug, “Don’t Make Me Think”).

THE HISTORY OF USER-CENTERED DESIGN

Throughout the past several years, with this evolution of the web there has been a greater emphasis on quality design and usability of products. Thus, these changes have given rise to the growth of usability research and user experience design.

User experience has its roots in the study of ergonomics, a field which was humanity’s first attempt to create and innovate based on human need. It tries to establish principles for design that make life more efficient and products more useful, comfortable, and beneficial. (In Blog, “History of User Experience”).

Ergonomics also greatly impacted the development of industrial design. Ergonomics has existed since 5th century BC, when people began to study the design of tools, trying to make work more convenient and efficient. (In Blog, “History of User Experience”).

In 1900, Winslow Taylor researched the interaction between workers and their tools for the first time. Toyota followed his lead years later, and created a “Human-Centered-Production system” in the mid-1940’s. The system was far leaner, but took into account employee and outsider input more than any other automobile manufacturer at the time. Their goals were to continuously strive for improvement, respect for all people, and operate based on the concept that the right process will bring the best results. This philosophy had extremely positive effects for the company, which provided a respectful and convenient worker environment. The hope was that these workplace improvements would improve the efficiency of workers (Turner, Auer, “A Diversity of New Work Organization”). The plan was so successful, it became one of the highlights for the then-evolving industrial design industry. (Medium, “The History of User-Experience Design”).

In 1955, Henry Dreyfuss wrote “Designing for People,” in which he writes “When the point of contact between the product and the people becomes a point of friction, then the industrial designer has failed.” Many UX designers have echoed this slogan today, in arguing that good design should be “invisible.” Dreyfuss also
wrote about the alternative route: “on the other hand, if people are made safer, more comfortable, more eager to purchase, more efficient—or just plain happier—by contact with the product, then the designer has succeeded.” (Medium, “The History of User-Experience Design”).

Far before user-experience designers ever existed, Dreyfuss essentially outlined their job description (In Blog, “History of User-Experience”).

The term “User Experience Design” was coined by the “Father of UX,” Don Norman, while he was VP of the Advanced Technology Group at Apple Computer (Norman, “The Design of Everyday Things” 4). His intention in doing so was to define a new term to encompass all aspects of a user’s interaction with a system, including the graphics, industrial design, the interface, the manual, and the user’s physical interaction. He was an electrical engineer and cognitive scientist by trade, and championed design for the sake of usability and functionality. One example of his thought process, taken from his book “The Design of Everyday Things,” is his description of how to appropriately design a stovetop.

![Figure 5: (UC Berkeley, “CourseThreads”)](image)

By positioning the controls for this stovetop in a way that reflects the way we’ve visually and spatially mapped the heated sections, it creates an understandable method for the user to navigate (Norman, “The Design of Everyday Things” 72).

Don Norman was ahead of his time, but has grown increasingly appreciated through the recognition of the value of user-experience research in past years. With the release of the iPhone in 2007, Steve Jobs and Apple unveiled a product that was remarkable in its software and hardware design, and revolutionary in its intuitive use of the touchscreen. Through this brilliant user experience, they brought the industry standard to an unforeseen height, and won numerous accolades and market success. Inevitably, this ignited the desire of other companies to do the same (In Blog, “History of User-Experience,” Isaacson, “Steve Jobs”).

**SO WHAT IS UX DESIGN?**

User experience design is a field that draws from many others—computer science, cognitive science, ergonomics, art and graphic design, psychology, communications, anthropology, and more. User experience designers possess “a philosophy that products and services should be designed so that they are pleasurable and easy for people to use”—Peter Merholz, the President and Co-Founder of Adaptive Path, a famed User Experience and Consulting Firm. UX designers are concerned with improving “the overall experience of a person using a product such as a website or computer application, especially in terms of how easy or pleasing it is to use” (Nielsen & Norman, “The Definition of User-Experience”).

At its core, user-experience design is the “application of certain user-centered design practices, a highly contextual design mentality, and use of certain methods and techniques that are applied through process management to produce cohesive, predictable, and desirable effects in a specific person, or persona (archetype comprised of target audience habits and characteristics). All so that the affects produced meet the user’s own goals and measures of success and enjoyment, as well as the objectives of the providing organization” (UXDesign.com “UX Design Defined”).

The basis of user experience design is rooted in an understanding of users needs, values, abilities, and limitations. It is the role of a user-experience designer to manage the expectations of the company while maintaining the user’s needs. This requires taking into account business and product goals, as well as the objectives of the developers.
WHAT DO UX DESIGNERS DO?

At the core of UX are factors like usability, usefulness, desirability, navigability, credibility, value, and accessibility. It is the role of a UX designer to keep these ideas in mind when doing their job. The role of “User Experience Designer” involves project management, user research, usability evaluations, information architecture, user interface design, interaction design, visual design, content strategy, accessibility, and web analytics. UX Designers benefit from having a background in all these fields. (UXDesign.com “UX Design Defined”)

WHAT IS THE UX PROCESS LIKE?

The process of gathering requirements is the first step in a user-experience design timeline. A user-experience designer starts by understanding the business requirements (the goals and needs of the company as well as any financial stipulations), design requirements, technology requirements, and user requirements for any project. User requirements include deciphering the following questions in reference to any project undertaken - Who is the product for/the main audience? How will they use it? Why will they use it? This is the key aspect of user experience design. The process each designer goes through differs, but I will outline a typical one in order to walk through the concepts a UX designer seeks to address with each project. (Nielsen & Norman, “The Definition of User-Experience”).

The typical UX process involves delving into any special requirements for the users, and overall accessibility concerns. In “traditional” or standard UX procedures, the designer then sets about developing a user “persona.” The persona (there can be multiple) is a hypothetical user that is representative of the population of users that will be using the product. You develop their likes, dislikes, occupation, demographics, and pain points, in order to “give a face” to the typical user and allow you to better serve their needs. (Nielsen & Norman, “The Definition of User-Experience”).

Then, a UX designer will perform any of a number of research methods that allow them to develop a task analysis, or determine the main task/functionality the user is attempting to get out of their product. They will also determine secondary tasks during this stage. Doing this allows the designer to determine how to handle errors, understand user movements and behavior through the product, and work to manage fringe cases. (Krug, “Don’t Make Me Think,” 103)

The next steps for the designer will depend on the project and the company. However, they often involve determining how the product will be allocated and logistically created. Then, once they have a significant amount of research backing, the designer will start sketching their first prototypes. This is often done in sketching, because it allows for multiple design iterations rather quickly. In “Agile” UX, and “Lean” UX, this often involves some user testing with these wireframes as well.

Once the low-level wireframing is complete, designers may create mid-level wireframes, flat designs, and/or move on to prototyping. Prototypes range from click-able PDF’s to working versions of the product (e.g. HTML/CSS web applications or websites).

One of the key parts of a UX Designer’s job is ‘User Testing.’ User testing can and is used at any stage from the very beginning of the project. It includes any process where user feedback is gathered regarding the product or designs for the product. This feedback is crucial because it allows you to refine the user experience and get the product as close as possible to the core principles outlined above (usefulness, navigability, etc.) (Buley, “User Experience Team of One”).

Once the user research has been processed and applied, and the user-experience designer has finished their final prototype, it’s time for the visual design and
development of the product. Sometimes, the user experience designer will have multiple job roles, and do some of the visual design or development. However, that’s not usually the case. Regardless, it is part of the user experience designers role to follow the project through, communicating often with the other members of the group to make sure the purity of the chosen design carries through to launch.

THE UX PROCESS FOR TASKTURNER WEB APPLICATION

TIMELINE & INTRODUCTION

When approaching the process of designing this web app, I took the time to record my ideas and organizational plan. I began by creating a thesis timeline, displayed below.

Figure 7: Thesis Timeline for Web Application

The purpose of this thesis was to take a project from start to finish, through the research, design, development, and marketing strategy. My goal was to make this project stand on its own, to follow it through as I would if I were founding a start-up company and developing my own product.

The type of process I chose to follow was a combination of traditional User Experience Research practices and the more popular “Lean UX” approach to modern design. “Lean UX” puts traditional UX into practice in a faster manner—using quick wireframing and collaboration with the client, project manager, and developers, to create a minimum viable product in the shortest amount of time possible. In the modern day world, this practice is used so that UX designers can keep pace with the quick turnaround time and workflow involved in technology companies. For this thesis, I wanted to showcase the basics, but adhere to the model that I would be using in a career setting.

When Brian Daley and I decided on the concept for this web application, we had one basic idea in mind. Brian had been having trouble as an adjunct professor in the Digital Media department with finding real-world applicable final projects for his students. This sparked the idea that it would be useful if different departments at UConn (and external clients) could post jobs for students. They would get labor for credit or for set cash stipends. The students would be able to apply to these jobs hassle-free, and interview for them.

TESTING METHODS AND DATA ANALYSIS

The first usability test I created was an important one—whether or not there was a market for this product. Unless users want to or need to use your product, it doesn’t matter how well-designed it is. Therefore, I used a ten question survey to target digital media students at the University of Connecticut and gather results about the applicability of our concept. As Brian and the staff from the department came up with the idea based on their own need, presumably the only need that we needed to evaluate was that of the student population.

The survey was given on a scale of one to five, one being “Not at all,” and five being “Extremely.” Most of the thirty-six students that answered the survey were freshmen (38.89%) and sophomores (33.33%), however there were also juniors (5.56%), seniors (13.89%), and graduate students (8.33%) polled. 57.14% were male, and 42.86% were female.
The students were asked about their skills relevant to completing digital projects, because these would influence their ability and willingness to apply to projects listed by those categories. The highest average ranking was for “Use of Technology,” followed by “Graphic Design,” “Social Media,” “Photography,” “Illustration,” and “Web Design.” However, the lowest of those—Web Design—still had 24 students of the 36 that ranked themselves “above average.” Subsequently, those students might be inclined to apply for a project in that category. The lowest scores for skills were in “Computer Engineering” and “Software Design/Engineering,” which is to be expected given that it was 100% Digital Media Students who participated.

When asked directly whether finding projects where they could use those skills would improve their chances of finding jobs and internships, thirty one said yes (88.57%). Additionally, when asked whether they were interested in doing projects for cash while at school, a whopping 94.29% said “yes” and 5.71% said “maybe.” When the potential payment changed from cash to credits, the answer varied slightly, but not majorly. 77.78% said “yes,” 19.44% said “maybe,” and only one participant (2.78%) said “no.” Subsequently, from the student’s side, the interest was overwhelmingly there.

The next task that I conquered by doing this brief survey was how to categorize the information about projects based on the way the user prioritized the information. In the survey, I asked “What factors would be important to you in determining whether or not to do a short-term project?” In this question (multiple choice and fill-in, if the user chose an “other” category), I put categories that two users brainstormed and deemed “important” in deciding whether to apply to a project. I also included similar categories from an analysis of the website “Kickstarter,” because the concept and functionality of their site is similar to this web app. Ultimately, potential answers to that question were the following: “Location (Storrs, Stamford, Remote, etc.),” “Level of Work Involved,” “Requirements/Skill Set Needed for the Project,” “Cash/Credit to be Gained by Participating,” “Information about the Project,” “Department or Company Listing the Project,” “Competition (How Competitive the Applicant Pool Is)” and “Other” (with the fill-in-the-blank option). In the end, the categories deemed most important were “Location,” and “Information about the Project.” Location was deemed to be “Extremely Important” by 55.56% of those polled, which further supports our idea that this web app and its on-campus recruitment concept would be well-received by the student population. The least important areas of consideration were “Department or Company Listing the Project” and “Competition,” though all of the categories were ranked with an average over 3, which means they were above average importance on the scale from “Not at All Important” (0) to “Extremely Important” (5). No respondents opted to use the fill-in form for “other,” supporting our assumption that we covered the main topics of importance to students when evaluating a project to apply for.

The final question in the survey was whether there was anything else the respondent would like us to know. Comments were overwhelmingly positive. Once filtered for relevance and usefulness, the main themes were that students who had run projects were also interested in using a tool to locate other students interested in participating. This was an intriguing concept I had overlooked in the initial planning stage—assuming that it would be mainly University Departments and external companies posting projects. Other students just offered encouragement or self-promotion, supporting the fact that they’d be willing to apply to projects, learn new skills, and/or work hard outside school if given the opportunity.

Once I had evaluated this survey and settled on the web app concept, I spent a large amount of time in the planning stages. I evaluated several other similar web apps and websites, in order to cross-compare functionality and effectiveness.

I spent time sketching my ideas, working through “throwaway concepts” of wireframes and user flows, just to understand the essence of the system I wanted to create. After I felt confident about the framework I’d established, I brought in several friends and recruited candidates to be involved in user-testing.

In the early 1990’s, Jakob Nielsen popularized the concept of “heuristic evaluation,” which is the method I used for my research. Nielsen researched the amount of users necessary in order to have sufficient evidence in usability testing. His argument was that if you use numerous small usability tests, typically with only about five users each, at various stages in the design and development, it’s enough. Otherwise, there are either too few users to learn from, or too many to really take into account their thoughts. Further, if your design is poor and confuses everyone, then it doesn’t do anyone good for the UX designer to watch users struggle through the same tasks over and over again. Subsequently, when I ran my usability studies, I brought 5-7 people in on multiple different occasions, to test through the iterations of my design. All of my participants were also Digital Media and Design Students or Department workers, my target market for the web app.

At the beginning of my research, I ran a card-sorting task, where the user would be given several index cards with different “tasks” listed on them. It was their job to place them in particular categories, which would tell me more about where the user would expect to find certain information on the site.
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Gate it on their own. So, during testing, I said very little, and did not answer any questions that were directly relevant to the task at hand. I was there as an encourager, but not a guide. Before going into these sessions, I wrote out a script of what to say at the beginning of the test, so that every user would have a similar experience and receive the same knowledge and assistance.

Very quickly (as in, after about three rounds of testing and revisions), I found that the essence of the web app could be boiled down to a few very basic user flows. In testing, I evaluated how well users were able to accomplish the key goals: posting a task, applying to a task, and browsing for the task they desired. I measured the percentage of tasks that users were able to complete correctly as a way to communicate a site’s overall usability. This started off relatively poor (about a 67.8% success rate for completing all three tasks), but increased significantly with each iteration. Iteration two had a success rate of 82%, and iteration three, which was tested by six users, had a success rate of 94.4% completion for all three tasks.

FINAL WIREFRAMING AND DESIGN

Using the analysis of this information as a basis, I set up a user flow diagram (a diagram showing the pages a user clicks and how they navigate through each part of the website) and wireframes (a visual map of each web page) for each of the app’s “webpages.”

With this diagrammed out, I created a basic clickable model of this web app using powerpoint. I had my participants click through with specific goals, a method called “Task Scenarios” in usability testing terms. The Nielsen and Norman group (a compound of the two masters of UX I mentioned earlier—Jakob Nielsen and Don Norman) state that task scenarios are essential, because “the most effective way of understanding what works and what doesn’t in an interface is to watch people use it. This is the essence of usability testing. When the right participants attempt realistic activities, you gain qualitative insights into what is causing users to have trouble. This helps you determine how to improve the design” (Nielsen & Norman, “Task Scenarios for Usability Testing”). Their suggestions are to make these scenarios realistic (i.e., one of my tasks was “You are a department head for the career center on campus, looking for a student to set up a social media plan. Post this task so that it’s viewable by potential applicants”), actionable (meaning there is something to be completed), and be sure not to give away how to use the interface. Users should be able to navigate it on their own. So, during testing, I said very little, and did not answer any questions that were directly relevant to the task at hand. I was there as an encourager, but not a guide. Before going into these sessions, I wrote out a script of what to say at the beginning of the test, so that every user would have a similar experience and receive the same knowledge and assistance.

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Final Wireframing and Design

After gathering verbal feedback and reviewing the information gleaned from the third task, I came up with a new user flow diagram.

Figure 8 & 9: Participant in Card Sorting Task

Figure 10: New User Flow
Figure 11: New Partial Wireframe

Figure 11 & 12: New Partial Wireframes

Figure 13: New Partial Wireframe/User Flow

Figure 14: Official Desktop Home Page Wireframe
Figure 15: Log In screen, Additional Functionality Wireframe

Figure 16: Browse Projects Page Wireframe
Figure 17: Official Desktop “Find A Project” Page Wireframe

Figure 18: Official (Advanced) Search Page Wireframe
Once tested, this version got a 100% success rate amongst eight different participants. The overall feedback was positive, as well, with many users remarking on the delightful simplicity.

The final design was this: the ‘home page’ had been boiled down to the essence of the site— it listed available options to the user in the form of a mad-lib style complete-the-sentence online form. Users saw the statement “I want to ______ a project.” They were then able to select from the dropdown menu list, either “work on” or “find a,” based on whether they were looking to work on a project or find one. Alternatively, they could also browse projects via the link in the navigation menu.

If they selected “I want to work on a project,” the submit button would take them to the browse projects page, with specific filters outlined at the top. For example, the default filters are “Show me [ALL] projects in [EVERY CATEGORY] [IN ALL LOCATIONS], posted by [ALL COMPANIES AND ALL DEPARTMENTS].” The following filter states: “Sort by: ________.” The default is to sort by most recent, but users are also able to sort by most popular (most applied to projects).
deadlines ending the soonest, best match, highest reward (cash) offered, and highest reward (credit) offered. Once the user fills out this section, they can minimize it via a dropdown link so that the full screen is dedicated to browsing.

When browsing, the projects listed are shown in tile format, each with their own image and information. Based on the most relevant information to the students polled in my survey, I listed that information with each project. For instance, each project has the deadline, the type of project based on its main category, the location, the potential reward, and the listing company or department.

Once a user finds a project that looks interesting, they are able to click through to the individual project page and find out more information.

Now, say a user is interested in posting a project - the web app takes them directly to the “post a project” page, which asks them only the essential questions to get their project posted.

At this point in the design, I was already relatively far along with the development portion. I had decided to use a CMS (Content Management System), in order to provide the essential back-end functionality I needed, and to make it easier to interact with the app’s database. I chose Wordpress, both because I am familiar with that CMS and because it’s arguably the best one for this purpose. Wordpress also had several plugins that would increase the web app’s physical functionality, without having to spend months on coding them (i.e. the login functionality, creating custom post types with which to sort, categorize, and display data).

I chose a Bootstrap-based theme, Keepsake, to build the app from, and ended up writing my own custom code for most of the major functions. I created custom post types for “Tasks”, which allowed me to learn how to group the data in a meaningful way. I also created several forms using a form handler that interact with the database of tasks - one to post tasks (on the post page), one to filter tasks (on the browse page), and one to direct the user to either the browse page or the post page, based on whether they want to work on or post a project. I customized the browse page as an archive of tasks for the user to view, and displayed information for each task that I had outlined in my design document. As part of the marketing strategy I also created a “branding guideline” and design style document for the web app, which (after much deliberation) I named “TaskTurner.” Though I tried many others, I felt that temporary projects were aptly named “tasks,” and I wanted the main goal of the app to be turning around temporary tasks quickly, which benefits both the student and the “task master” (as I secretly nicknamed those who post tasks).
Taskturner Brand Standards

Logo Font: Nevis Bold
HEADER: CAPS LOCK 22PX Quicksand
Header Two: 20px Quicksand
Header Three: 18px Quicksand
Body Copy Font: 14px Aleo Light

THIS IS A SAMPLE HEADER
This is another header
This is a third header
This is a sample this is a sample this is a sample
this is a sample this is a sample this is a sample
this is a sample this is a sample this is a sample

Alternates/Inversions:

Figure 25: Screen Shot of TaskTurner contact page
Figure 25: Screen Shot of TaskTurner browse projects page
Figure 26: Screen Shot of TaskTurner Post a Project page in Mobile

Figure 27: Screen Shot of TaskTurner Post a Project page in Mobile, with Mobile Navigation
Fields marked with an * are required

**Task Title**

25 character(s) left

**Type of Task**

- Graphic Design
- Web Design
- Web Development
- Illustration
- Game Design
- Branding/Marketing

Figure 28: Screen Shot of TaskTurner Post a Project page in Mobile

Figure 29: Screen Shot of TaskTurner Browse Projects Header in Mobile

**tasks**

User-generated tasks, published on a for-hire by credit or cash basis.
CONCLUSIONS

In the future, I plan on refining the app even more, plus adding some more functionality, as I expressed earlier. I’ve also bought the domain name “taskturner.com”, with the intention of hosting it there and marketing it to the University. My journey with this app is far from over with the submission of this thesis, but in making sure the beginning stages of design and development were tested and thought out thoroughly, I feel I have already won.

Eventually, I think it would be wise to implement some sort of login system, so that users can save their favorite projects, and so that the app can identify which users are posting projects, and which are applying, in order to serve them the appropriate content. For instance, if I were a department head who often posted projects, I might want to have access to the top student applicants (who was applying, and who was successfully getting jobs) for the category of task I need finished. If I were a student, I might want to receive email updates whenever new tasks that might be relevant to me are posted. These concepts were beyond the scope of this project, but as I continue working on it, I will start testing these functionalities and readying them to be added.

Though there is certainly more to come for TaskTurner, I am completely satisfied with the sheer amount of knowledge I’ve gained by completing such a project. Armed with my degree in Human-Computer Interaction and my experience from building TaskTurner, I’ve cultivated my deep understanding and curiosity for people and the way they interact in a digital world. I feel strongly that my best design work will be seen when users do exactly what the product intended them to do, and I will strive to make my work an experience for every user, rather than just something to be viewed. I’ve learned how to think, how to apply my knowledge of human behavior, and how to take an analytical approach to a creative industry. I’ve been able to draw out consumer insights to input into my design work, and that experience alone has been invaluable.
WORKS CITED


Stone, Brad. The Everything Store: Jeff Bezos and the Age of Amazon. Print.


