Surrounded By Systems

ARTG 5610 Design Systems
Charles Andrews, Fall 2020

Design & Systems Manifesto

In 5 Parts

Introduction

We are surrounded by systems, as designers and as human beings. Throughout the course of the semester, I have studied systems that grant unemployment in Massachusetts, cook food, sing to children, produce coffee, and display our memories. Systems produce joy from electricity, goods from human labor, and unforgettable experiences via design process. As systems continue towards complexity, they become riddled with deep seeded flaws, leading to human error and breakdown. Large scale system malfunction, such as the wireless emergency alert that informed Hawaii of a false alarm ballistic missile threat in 2018, can lead to mass panic. As designers, we need to determine how systems operate from their initial inputs to the final outputs in order to create patches that preserve or enhance its functionality. At the core of design is surveying reality in order to create a new one.

Design is intelligent response to uncertainty and ambiguity. Within systems there is plenty of uncertainty and ambiguity. Diagramming enables visualization of systems to better understand the sequencing and relationships between the patterns that form objects. From this vantage point, designers can determine where their solutions might fit in to solve problem areas. An intervention is only as effective as its framing within the system. As designers imagine the future, it is important that they have a firm grasp on systems thinking in order to understand the consequences of their decisions. In design, every choice has an impact. Designers need to collaborate and accept what they do not know in order to create a future that works for all of humanity. One designer alone cannot take on the complexity of systems, but with the help of others they might stand a chance.
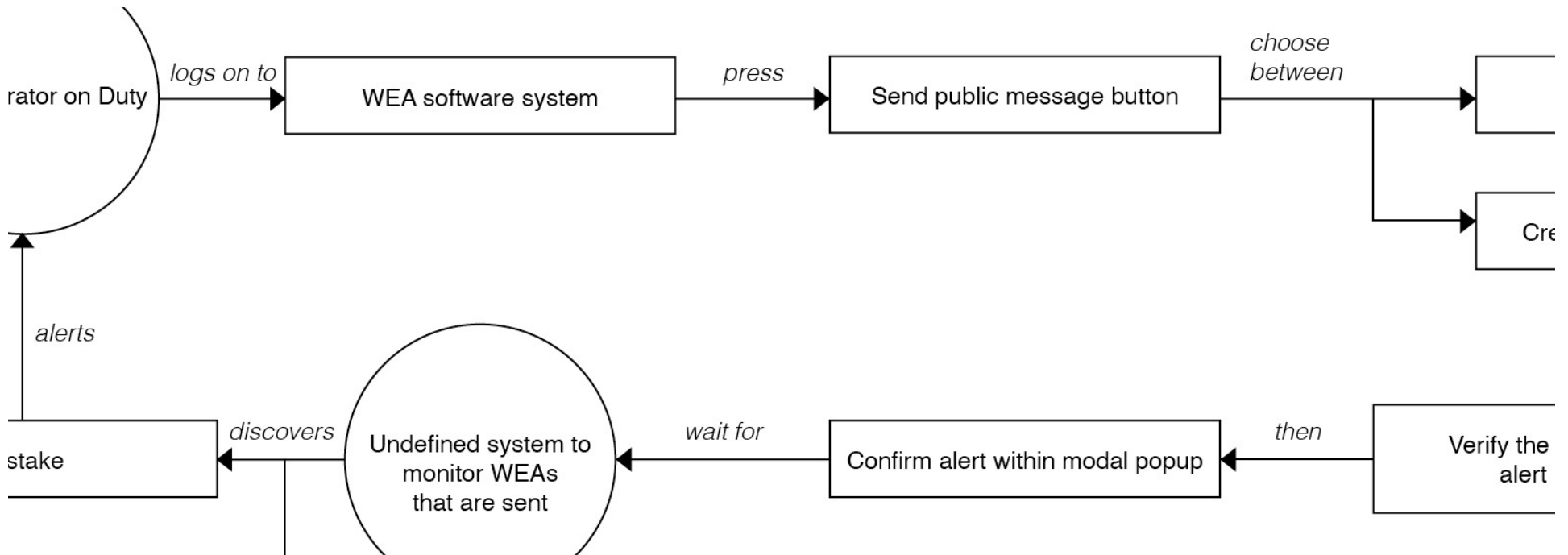
Section One
How is design a system and what systems constitute its practice?

Design follows a process, whether it be conscious or subconscious. The process can be time consuming and expansive, such as in the design of a new interface, or briefer and more pointed, such as in the technique of Impressionist painters who created works in a one sitting. Regardless of the intent, an archetypal two-step process (see **Figure 1**) begins with an input–the problem. During the analysis phase, a designer investigates the community that is facing the issue, then explores the conventions which that community follows and context in which the problem occurs. This broad investigation provides an understanding of background, leading to overall recognition of the initial question and the systems involved. A midpoint of momentary clarity becomes the starting point for the synthesis phase, where the research produced in the analysis phase is matched with potential solutions. These initial ideas are reviewed to determine their impact on the community, their conventions, and the context. Consideration of research and the effectiveness of solutions helps the designer refine these ideas into a single holistic solution, becoming the final output.

At any point, the input, research, preliminary solutions, or output can be brought to the community for testing. This creates feedback loops that may require revisitation to a previous step and lead to new analysis or synthesis. Design process is inherently a system because it produces an output from an input and follows a structure that can be traced and evaluated. The specific form of the system is shaped by the imagination of the individual who has accepted the challenge- the designer. Like all systems, design process is not immune to error or flaws. It has the potential to lead to breakdown and subsequent failure if not redirected on course. In cases of complex problems, it may be helpful for designers to follow a more rigidly defined process to combat the ambiguity of the investigation. In other instances, the design process might unfold in the moment as a result of spontaneous ideation.
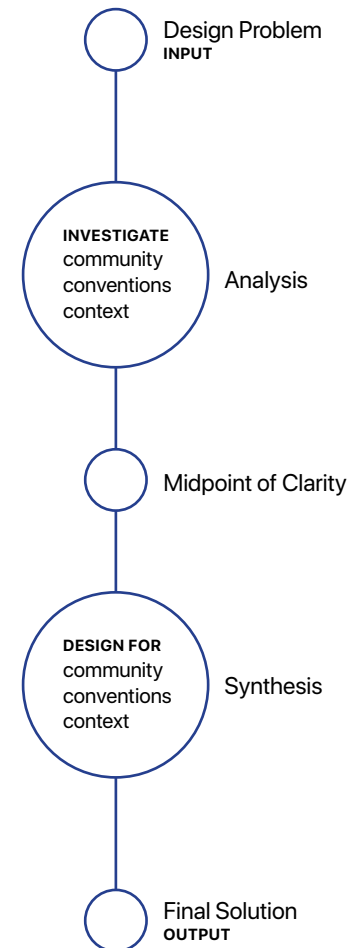
Figure 1: *Basic Structure of Design Process*

Design Problem
INPUT

INVESTIGATE
community
conventions
context

Analysis

Midpoint of Clarity

DESIGN FOR
community
conventions
context

Synthesis

Final Solution
OUTPUT

Figure 2: *Diverging and Converging Design Process*
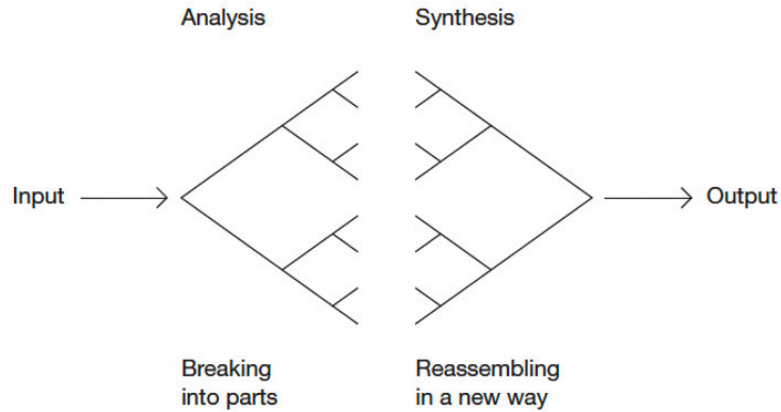Sourced from **How Do You Design**

Figure 3: *Oscillating Design Process*
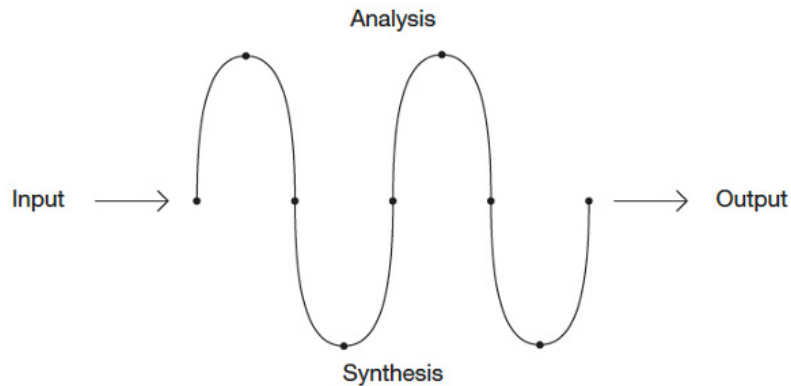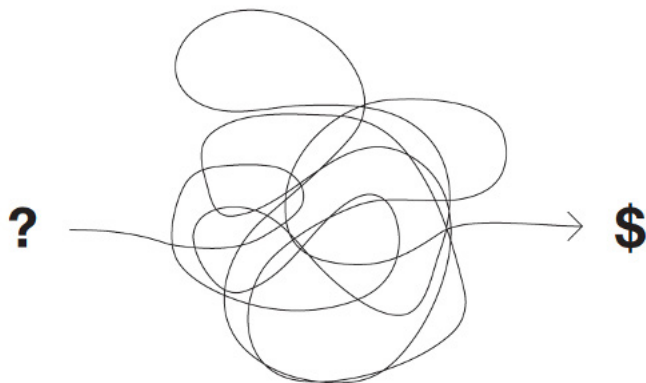Sourced from **How Do You Design**

Figure 4: *Chaotic Design Process*
Sourced from **How Do You Design**

Design process is by nature solution oriented. It requires creativity and innovation to explore questions without clear answers. Thus, there is much room for flexibility and experimentation.

Figure 2 shows a process which diverges into smaller fractal problems in the analysis phase. At the midpoint, these "mini problems" are resolved with individual design ideas. These preliminary ideas are then refined and converged into a single optimal solution. This process evolves in a similar manner to how I completed the field studies featured in this workbook, where I focused on observing a system then shifted to interventions to the problems that presented themselves.

Figure 3 shows a design process that oscillates between a focus on analysis and synthesis. This is similar to how I completed my accident study for the semester. I found myself switching between researching the factors of causation and framing my findings into solutions that might potentially resolve the issues.

Lastly, **Figure 4** shows a chaotic process, described by Tim Brennan, where the focus begins with a problem and ends with a solution that has value. The diagram describes the "black box" nature of most design processes. When I begin visual design projects, I often feel a sense of anxiety in the confusion of determining what elements are important to communicate and how to place them. The anxiety and subsequent "lightbulb moments" lead me down rabbit holes of trial and error that are messy and disorganized like this visualization.
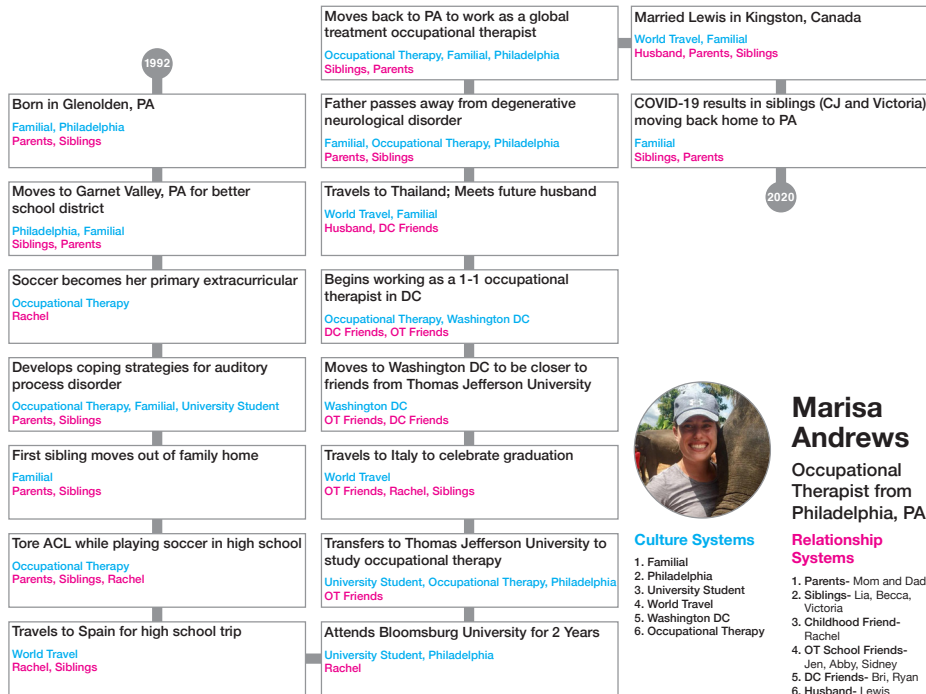
Section Two

How can systems be identified, regulated, evaluated, improved, perfected, disabled and disrupted?

The study of systems began with exploration into the parts and communities inherent in organisms. Through this scientific study, systems thinking was developed to analyze the relationships that exist between all areas of matter. Today, systems thinking is a tool that experience designers utilize to understand the systems inherent in their projects so that they may determine opportunities for intervention. Studying the parts that create a system at large requires dynamic, creative techniques of mapping to visualize the relationships between patterns. Boundaries and scope need to be adjusted to account for the complexities and infinite connectivities of contemporary systems. The framing of an invention within a system determines its possibilities for successful disruption.

In **Figure 5**, I identified the major events within my sister Marisa's life that have occurred since her birth. After ordering these events into sequential order, I

determined the major cultural and relationship systems that appeared consistently and tagged them in order of prevalence. Reviewing this mapping reveals how the events are connected and laid the foundation for their successors. From this vantage point, one can evaluate the individual's past, present, and future self based on their vital systems.

Figure 6 details how Starbucks stores produce food and beverage for customers. The system is divided into four distinct phases that visualize the flow of attention (energy), as depicted through arrows. In the input phase, the store is prepared for its daily operations through subtasks that provide the materials needed for the opening shift. Given the appropriate coffee, food, labor, and environment, workers prepare the store's products according to customers' orders. The output of this labor, in the form of profit and customer satisfaction, is analyzed through team meetings and corporate auditing. This feedback inspires improvements in terms of recipes, workflows, and organization. Stores discover new opportunities within their individual operations. Corporate explores new employee or customer initiatives to globally improve stores. Throughout each phase, store management regulates operations for financial success.

Figure 5: *The Life of Marisa Andrews Mapping*
See Enlarged on **Page 15**

Figure 6: *Starbucks Store Operations System Diagram*
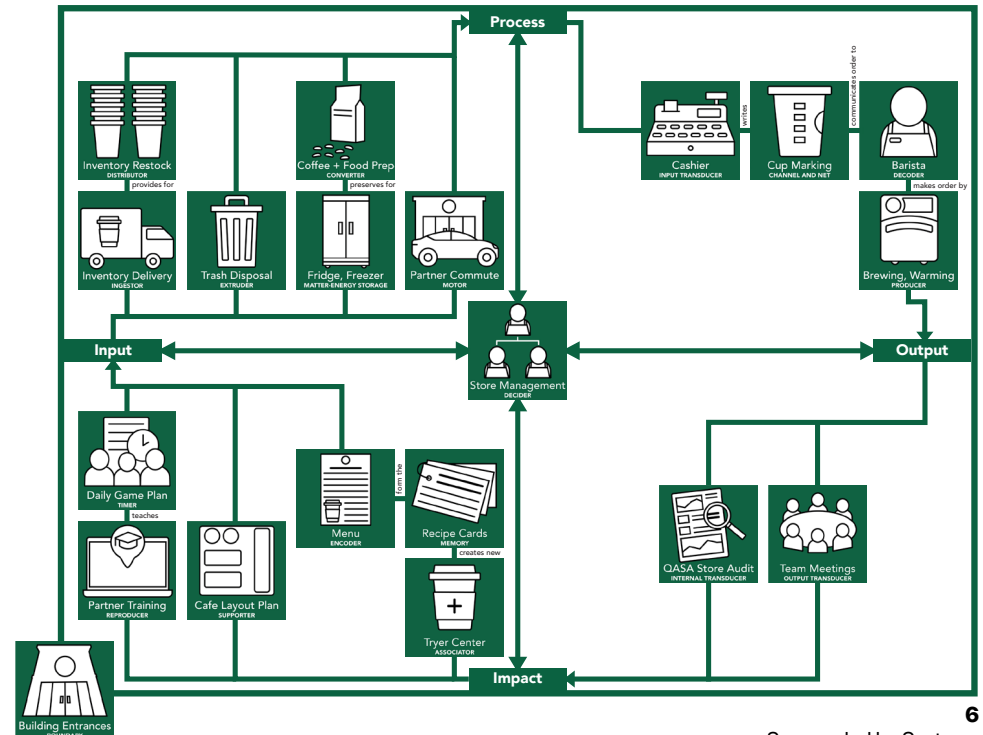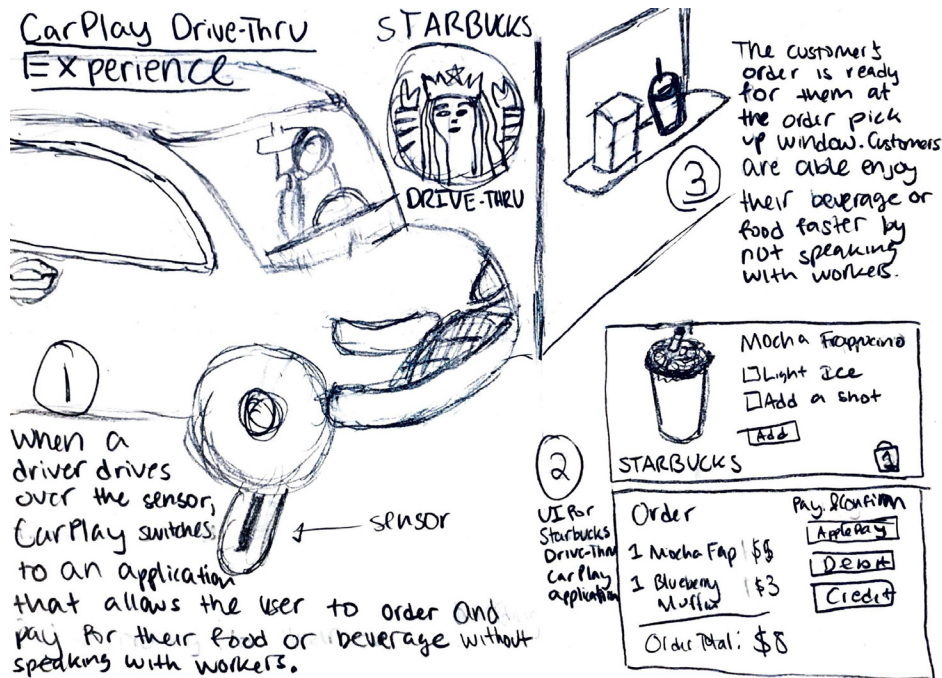See Enlarged on **Page 16**

Figure 7 aims to expand the system of CarPlay, which is a software that allows iOS devices to connect to a vehicle's head unit screen. Through investigation into the processes and functionalities present in this platform, I imagined how the system could be disrupted to function as an ordering device for customers waiting in a drive-thru. When a customer's vehicle drives over a sensor on the ground, a menu appears on the head unit, allowing them to order via touch screen rather than human interaction. This improvement regulates order and payment collection to decrease wait time and alleviate some task burdens of the workers. Customers also enjoy a higher level of customizability without having to specify their requests verbally.

Finally, **Figure 8** shows how the system of preparing a recipe can be disabled partially to automatically perform steps previously done by humans. This web/mobile application allows users to upload a recipe to create a swipe through module that incrementally details the steps of the preparation process. The application's connection to the user's smart appliances grants the technology the ability to automatically perform tasks such as preheating the oven, timing a roasting process, or incrementally increasing whisking intensity. Rather than the user constantly referring back to the recipe, this intervention walks the user through the cooking process, alleviating stress for a more enjoyable system overall.

Figure 7: CarPlay Drive-Thru Integration Disrupts the Takeout Experience
See Enlarged on **Page 37**

Figure 8: Sous Chef Web/Mobile Application Guides Users Through New Recipes
See Enlarged on **Page 43**
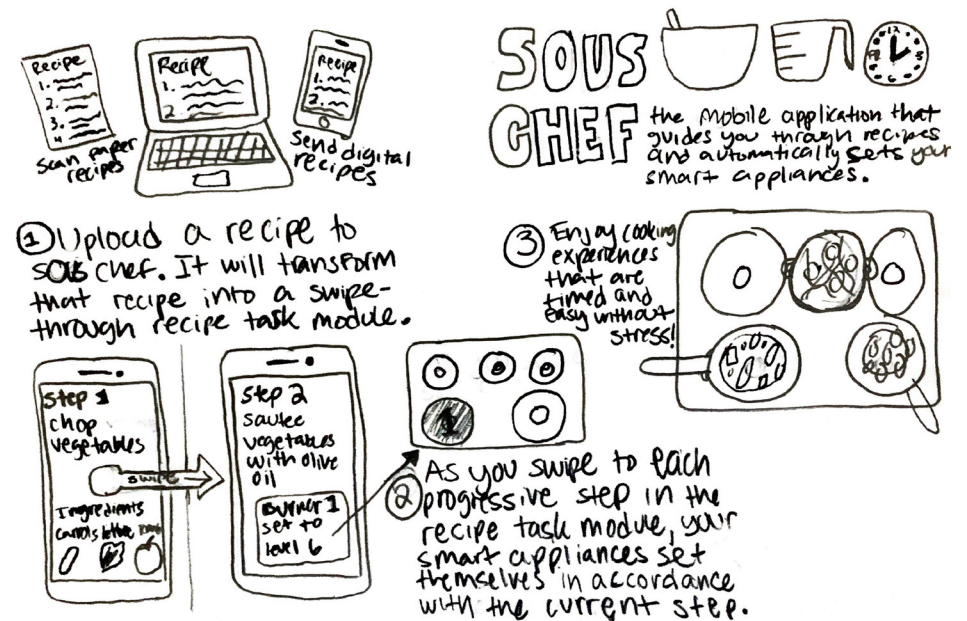
Section Three

What is the relationship between design process and systems thinking?

Design process is a system of solution-oriented investigation which allows designers to examine and improve the systems around them. Throughout the design process, the target system instigated in the design problem input is analyzed from a variety of scopes and boundaries to determine opportunities for improvement, disruption, or disablement. In the analysis phase, a designer first employs contextual inquiry to gather data about the system through interviews and holistic research. Next, they examine the information as a whole through contextual analysis, creating diagrams that map out the patterns and flow of the system. Considering the peripheral systems, communities, and conventions of the target system provides a multifaceted perspective on the design problem. The analysis phase produces an empathetic understanding of the patterns and relationships within the target system, thus illuminating its inherent inefficiencies and flaws. These issues are the "jumping off point" for the synthesis phase, where preliminary solutions take form through sketching and brainstorming. The ideas are placed into context of the designer's understanding of the system to determine their possibilities for positive impact. The realizations and data from the analysis phase guides the conceptualization of a single solution output.

This semester, I embarked on a 3.5-month exploration into the 2018 incident where a wireless emergency alert (WEA) mistakenly informed the Hawaiian public of a non-existent ballistic missile threat. In a similar manner to the design process just outlined, I investigated the major flaws in the protocol and software employed by Hawaii Emergency Management Agency (HEMA) to send the WEA.

Figure 9 details my findings at the halfway point of the project and the subsequent possibilities for intervention I planned to pursue. In the accident phase, I studied the protocol pitfalls from the point of view of HEMA and the operator that made the mistake (aka Employee 1). Furthermore, my research into HEMA's WEA software revealed that the system relied on templates that did not adequately communicate whether they were of a test or live alert type. I decoded the accident's causes as a lack of process controls on the part of HEMA and the template structure found in the software UI. In creating this diagram, I visualized my realizations about the instigated systems in the accident and how they led me towards the proposed interventions.

Figure 9: *Model of Accident & Innovation within Hawaii's Wireless Emergency Alert Software System*
Template Sourced from **A Model of Innovation**

community
- Hawaii Emergency Managment Agency (HEMA) needs improved processes and software that allows them to organize WEA templates that are tests or live
- Hawaii citizens are anxious from the false alarm WEA and question the government's capacity to keep them safe

pressure (external)
Hawaii citizens demand answers as to why HEMA employees sent out a false alarm WEA on Jan 13

decay (internal)
FCC launches investigation into the events of Jan 13 in order to discover the errors in HEMA's processes

convention
- Lack of system safeguards
  - Following the event it took 38 minutes for the false alarm WEA to be called off
  - Unclear process in place in the event of a false alarm WEA
  - Lack of drills
- Issue prone WEA software UI
  - WEA templates are not clearly marked as test or live
  - Previews are not clear about template type or displayed in confirmation modal

change (disturbance)
FCC cites a lack of "reasonable safeguards and process controls" as the cause of the catastrophe

context (environment)
- Period of increased tensions between US and North Korea
- HEMA and Employee 1 disagree on why Jan 13 happened

misfit (pain)
Hawaii citizens, as well as US citizens, fear that WEAs are not managed well enough to reliably inform the people

accident

decode   **reconnaissance**

recognition (definition)
HEMA's current processes and software UI does not allow employees to accurately inform the public with WEAs in the event of catastrophe

innovation
- Accident proofing WEA software UI
- Improving safeguards in place for accident prevention and detection

(a bit of luck) preparation (immersion)

insight (seeing opportunity)
The ability to improve HEMA's processes and WEA software UI to better inform the people

research

individual (you)
Researching the process failures and UI design issues that led to Jan 13

design

articulation (prototyping)
- Prototype an improved version of WEA software that better distinguishes between test vs live WEA templates
- Instituting safeguards tin HEMA's processes to better protect against error

invention

demonstration (testing)
- User testing WEA software improvements to determine their success
- Consultation with peers about process improvements

›**community 2**
- Hawaii Emergency Managment Agency (HEMA) better infroms the public through process improvements and more visible WEA software UI
- Hawaii citizens feel more secure in their government's ability to protect them

decide   **renaissance**

convention 2
- Well guarded WEA system
  - No further false alarms
  - More efficent response times in the event of a mistake due to training and safeguards
  - Unclear process in place in the event of a false alarm WEA
- Software UI more clearly shows difference
  - Templates clearly distinguish between test and live alerts
  - Previews allow operator to better understand what they are sending out to the public to prevent mistakes

adoption (counter-change)
HEMA institutes process improvements and improvement to WEA software

beliefs
- HEMA and government are disorganized and using poorly design software
- Hawaii citizens believe they are going to die until the WEA was called off 38 minutes later

actions
- Employee 1 sends out false alarm WEA\
- HEMA does not detect and respond to mistake for 38 minutes, resulting in widespread panic in Hawaii

artifacts
- WEA software (similar to AlertSense)
- WEA alert sent to Hawaii citizens

intervention

context 2
- American public is better informed in the event of a nuclear ballistic missile
- HEMA is more well organized

fit (gain)
Nationwide WEAs are more well managed through new process safeguards and the improved visibility of software UI

value
- WEA software UI has better visibility
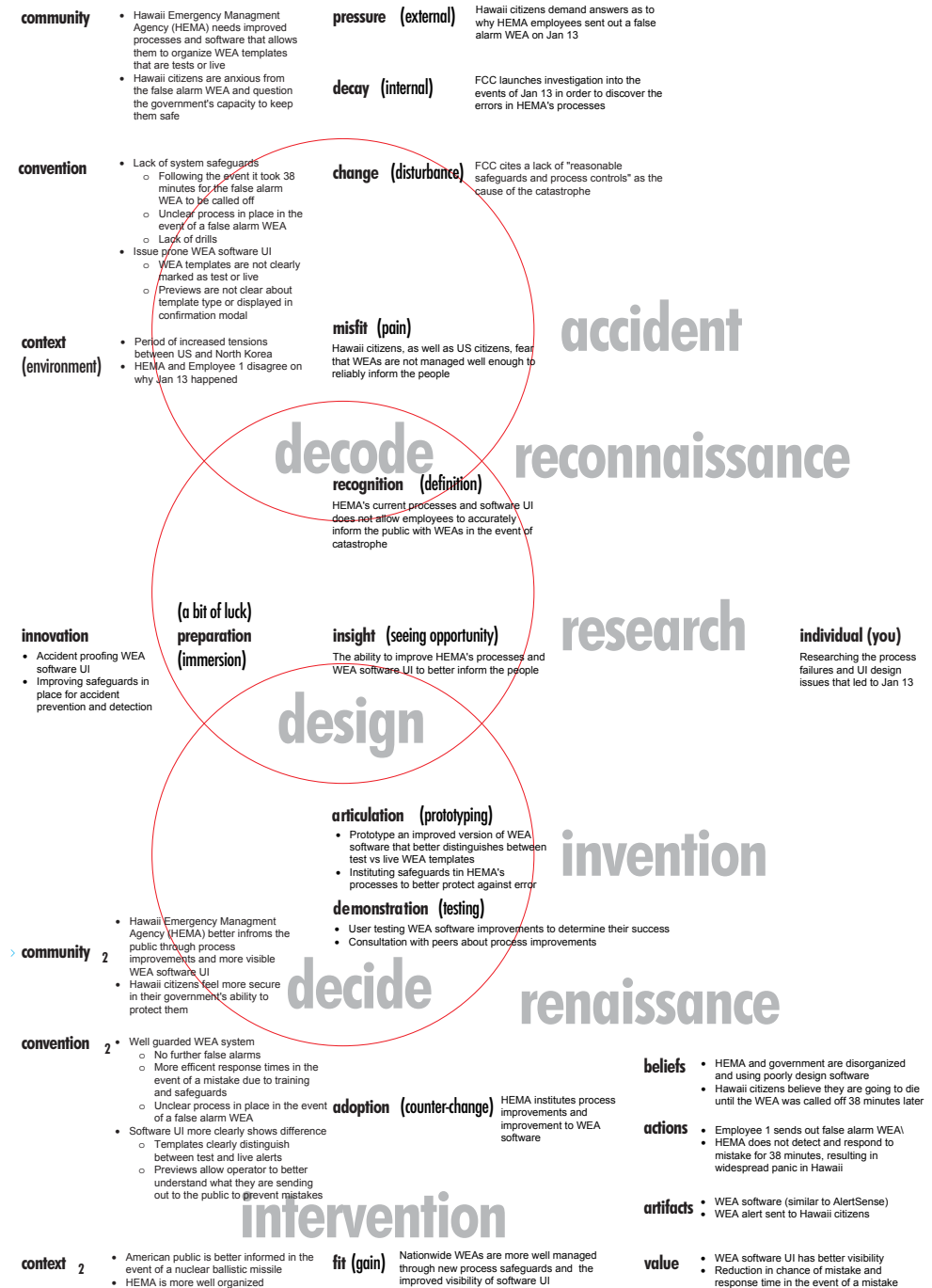- Reduction in chance of mistake and response time in the event of a mistake

Figure 10 is a "mindmap" of the relationships between the events and flaws that led to the accident. It summarizes the accounts detailed by HEMA and Employee 1, as well as the societal context of the accident. This relic of my analysis process helped me visualize the factors of causation in terms of expanded boundaries and peripheral systems.

Before finalizing my proposed protocol and UI improvements, I compared the original system diagram of sending a WEA (see **Figure 11**) to a diagram demonstrating the process changes (see **Figure 12**). Juxtaposing these two renderings helped me visualize the impact of my interventions. The differences in the processes showed how the WEA sending system would be disrupted step by step to maximize safeguards in protocol and the software UI. The major changes to the system include: requiring two monthly trained operators to collaborate on sending a WEA, specifying the message type when a template is being prepared to send, and designating the Director of HEMA as the individual responsible for monitoring for mistakes.

Figure 11: Original System Diagram of Sending a Wireless Emergency Alert

Figure 10: Mindmap of the January 13th Hawaii Ballistic Missile Scare Accident
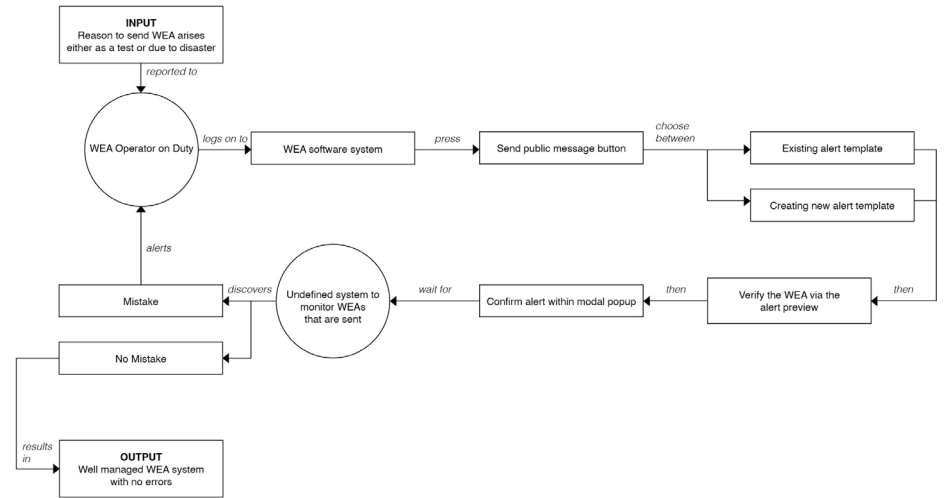
Figure 12: Improved System Diagram of Sending a Wireless Emergency Alert
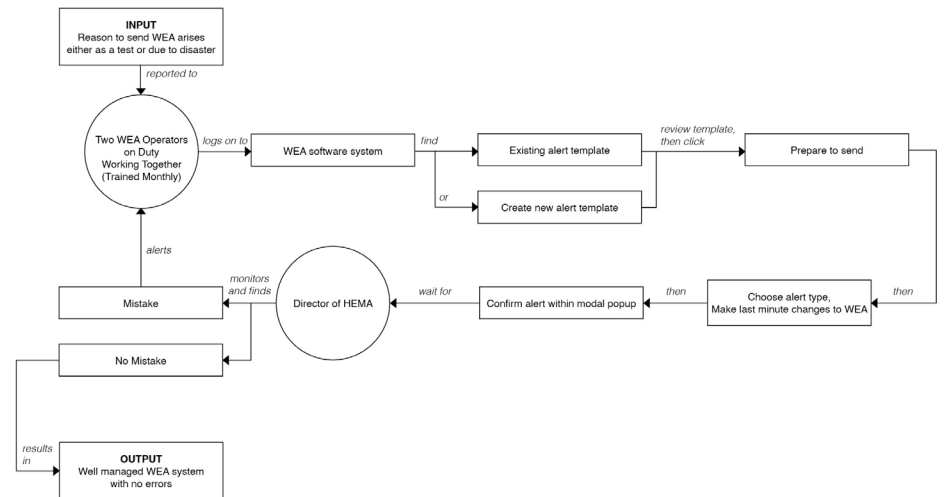
The result of my systems thinking throughout the design process culminated in the UI prototype shown in **Figure 14**. This prototype was designed to better inform the user of the message type they are sending as they make decisions in the UI. **Figure 15** is a "transcendental solution" to my exploration into the trauma the public experienced as a result of the false alarm ballistic missile warning. Regardless of the errors within HEMA's protocol, it became evident that WEAs were not providing enough resources to prepare the public for an impending disaster. In order to combat panic, I proposed a new WEA design that provides the source for the disaster's detection, an emergency preparation helpline phone number, and informative videos from scientists, psychologists, and government. Overall, these interventions were a direct result of my reconnaissance into the accident and the system visualizations I composed to organize the factors surrounding the event.

Figure 14: *Improved Sending Workflow within Wireless Emergency Alert Software*
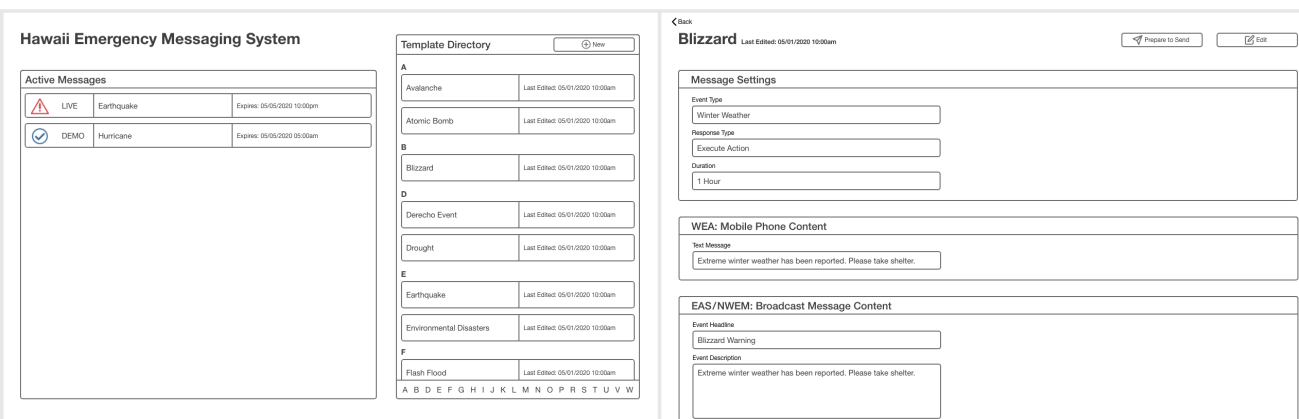
Figure 15: *Improved Wireless Emergency Alert Messaging Design*
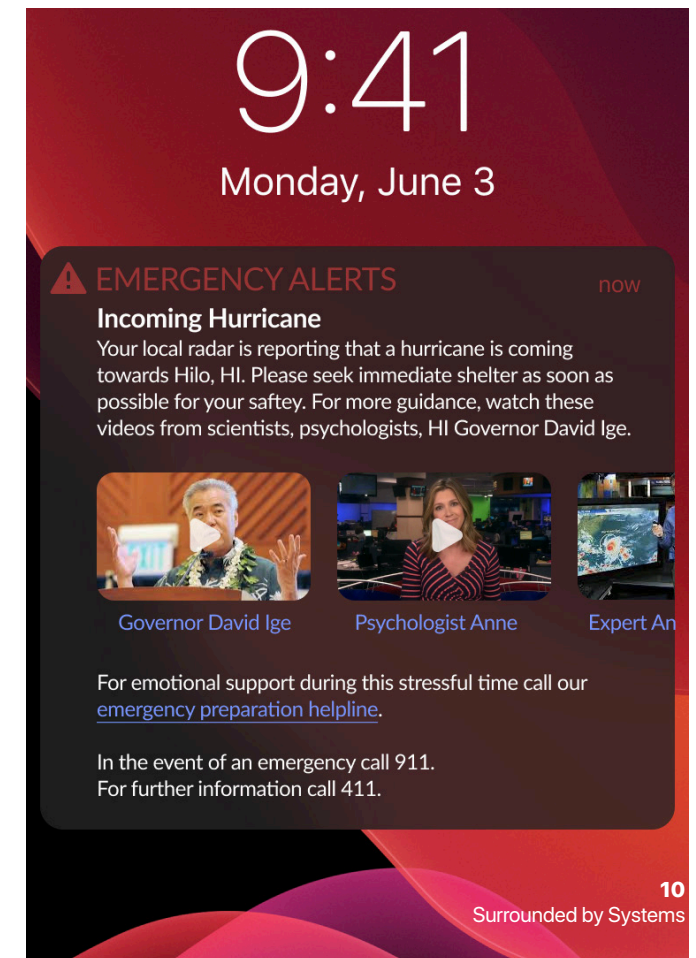
Conclusion

Design for the worst-case scenario. Focusing on the scenario where each part of a system proceeds as planned is easier to understand and design for. It might speed up the process, look cleaner, or be easier to explain to others, but it is not good design. When edge cases contrary to the expected flow of the target system are considered in the design process, designers can create solutions that weather the storms of time and chaos. Disorganization in the event of an obstacle spells system breakdown. Holistic understanding precedes action in the best solutions. Consider all possible outcomes of the system and plan out how the final intervention will behave in each instance. Instead of focusing on the probability of success, focus on the variety of possibilities. Possibilities are riddled with unforeseen sources of error that can be avoided if the right precautions are taken. When mistakes fall through the cracks, the solution should be able to swerve back towards safety.

Figure 16 shows a graphic, seen on the cover of this workbook, that is representative of this principle of planning for the worst-case scenario. A mistake such as the WEA in 2018 that misinformed the Hawaii public of a non-existent ballistic missile threat was not the expected outcome of the system. In most instances, operators were able to overcome the disorganization within HEMA's protocol and software to do their job. A deck has a 51 in 52 chance of revealing a card that is not the two of diamonds. However, as long as stress plagues a system, there is the chance for breakdown. There is the chance to receive the two of diamonds. There is the chance that a HEMA operator will fall victim to the disorganization within software or protocol and send an alarm that results in unnecessary state-wide panic and trauma. As designers, it is our duty to empathize with those involved with and impacted by the target system in order to guide them towards success. We need to stop blaming individuals operating within a poorly structured system and start blaming bad design. As technology continues to be adopted into every area of human life, designers need to proceed with empathy and caution in order to create authentically optimal interventions.

Figure 16: Cover Graphic

Weekly Assignments

9 Mini Projects

1. Finding and Fixing Flaws: MA Unemployment Application System

The Problem

Since March, I have been working to collect MA unemployment after I was laid off from my co-op due to the pandemic. The process of applying initially was fast and convenient because I was able to submit the forms online and wait to hear back about my decision. However, after being denied, I had to fill out additional forms to prove my eligibility. After filling out multiple forms, I discovered that most of the additional paperwork had to be submitted through the mail and could not be submitted online. This was frustrating for me because I didn't know if my forms were reaching the office because I did not receive feedback when they arrived. Thus, I was forced to call the helpline in order to confirm the arrival of my forms, which took about an hour each time. This created a massive backlog for the helpline at scale because they had a large number of people calling about a simple inquiry that could be answered with a form of digital feedback.

Proposal

If the application is accepted on the first submission, the process reaches an output faster, saving time and effort for both the applicant and office. The flaw in this application system presents itself when additional forms need to be submitted. While currently not all additional paperwork can be submitted online, changing this would make the process easier on the applicant because they would not need to worry about the forms arriving through the mail. Additionally, the office would receive fewer calls about mail, which would help decrease the wait time on the helpline, and could start reviewing additional paperwork faster. If creating this upload functionality is not possible, then this flaw could also be solved by creating a feedback system where the applicant is informed that their paperwork has been received. Then, the applicant would know they just need to wait for their decision after the office reviews their paperwork.

System Diagram of Unemployment Process
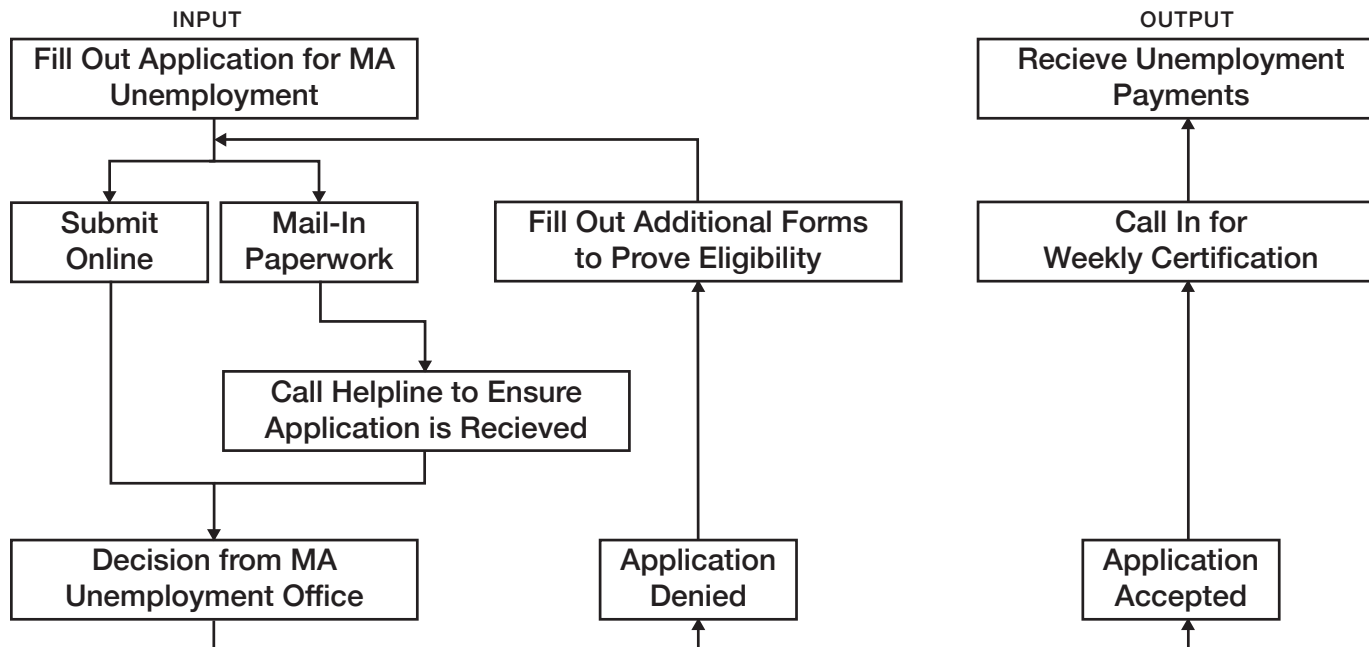
2. Search, Research, and Reconnaissance: Six Degrees of Seperation

Coffee — Coffee Beans — Flavors — Variety — Wealth — Societal Advancement — Renaissance — Linear Perspective
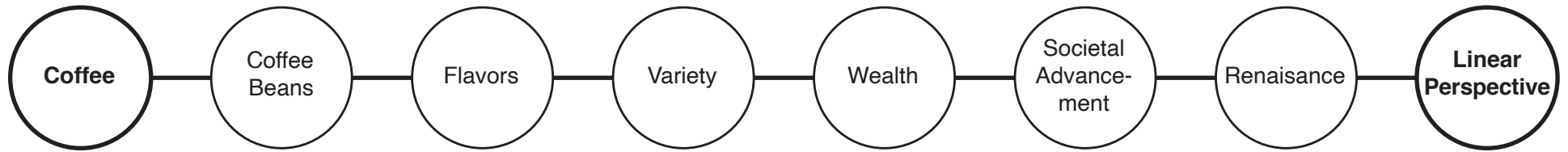
Coffee - Coffee Beans
STRONG CONNECTION

Coffee is brewed from coffee beans using water. Coffee beans are necessary in order to produce the beverage.

Coffee Beans - Flavors
STRONG CONNECTION

Coffee beans determine a specific brew's flavor. Each bean type has a flavor with a unique taste and aroma.

Flavors - Variety
STRONG CONNECTION

Flavors are plentiful for most food and drinks, allowing consumers to customize their requests. Flavors inherently create variety.

Variety - Wealth
MEDIUM STRENGTH CONNECTION

Having variety and options is a luxury available only to wealthy, developed societies. However, there are some exceptions to this rule.

Wealth - Societal Advancement
STRONG CONNECTION

Wealth of land, food, materials and other resources allows humans to focus their efforts on improving their society. Only when humans are guaranteed the basic necessities of life are they able to invent, discover, and reform.

Societal Advancement - Renaissance
STRONG CONNECTION

Marking the end of the dark ages, the Renaissance started of a new age of advancement in literature and the arts. Humanism, a major ideal of the era, encouraged self-achievement and education. This set humanity on the path towards industrialization.

Renaissance - Linear Perspective
STRONG CONNECTION

The Renaissance saw the popularization of linear perspective, a system of creating an illusion of depth that utilizes orthognal lines that converge at a single vanishing point. This practice was lost following the Greek and Roman periods, but was revived and developed further by the artists of the Renaissance.

3. Curiosity, Conversation and Connection

1992

Born in Glenolden, PA

Familial, Philadelphia
Parents, Siblings

Moves to Garnet Valley, PA for better school district

Philadelphia, Familial
Siblings, Parents

Soccer becomes her primary extracurricular

Occupational Therapy
Rachel

Develops coping strategies for auditory process disorder

Occupational Therapy, Familial, University Student
Parents, Siblings

First sibling moves out of family home

Familial
Parents, Siblings

Tore ACL while playing soccer in high school

Occupational Therapy
Parents, Siblings, Rachel

Travels to Spain for high school trip

World Travel
Rachel, Siblings

Moves back to PA to work as a global treatment occupational therapist

Occupational Therapy, Familial, Philadelphia
Siblings, Parents

Father passes away from degenerative neurological disorder

Familial, Occupational Therapy, Philadelphia
Parents, Siblings

Travels to Thailand; Meets future husband

World Travel, Familial
Husband, DC Friends

Begins working as a 1-1 occupational therapist in DC

Occupational Therapy, Washington DC
DC Friends, OT Friends

Moves to Washington DC to be closer to friends from Thomas Jefferson University

Washington DC
OT Friends, DC Friends

Travels to Italy to celebrate graduation

World Travel
OT Friends, Rachel, Siblings

Transfers to Thomas Jefferson University to study occupational therapy

University Student, Occupational Therapy, Philadelphia
OT Friends

Attends Bloomsburg University for 2 Years

University Student, Philadelphia
Rachel

Married Lewis in Kingston, Canada

World Travel, Familial
Husband, Parents, Siblings

COVID-19 results in siblings (CJ and Victoria) moving back home to PA

Familial
Siblings, Parents

2020

Marisa Andrews

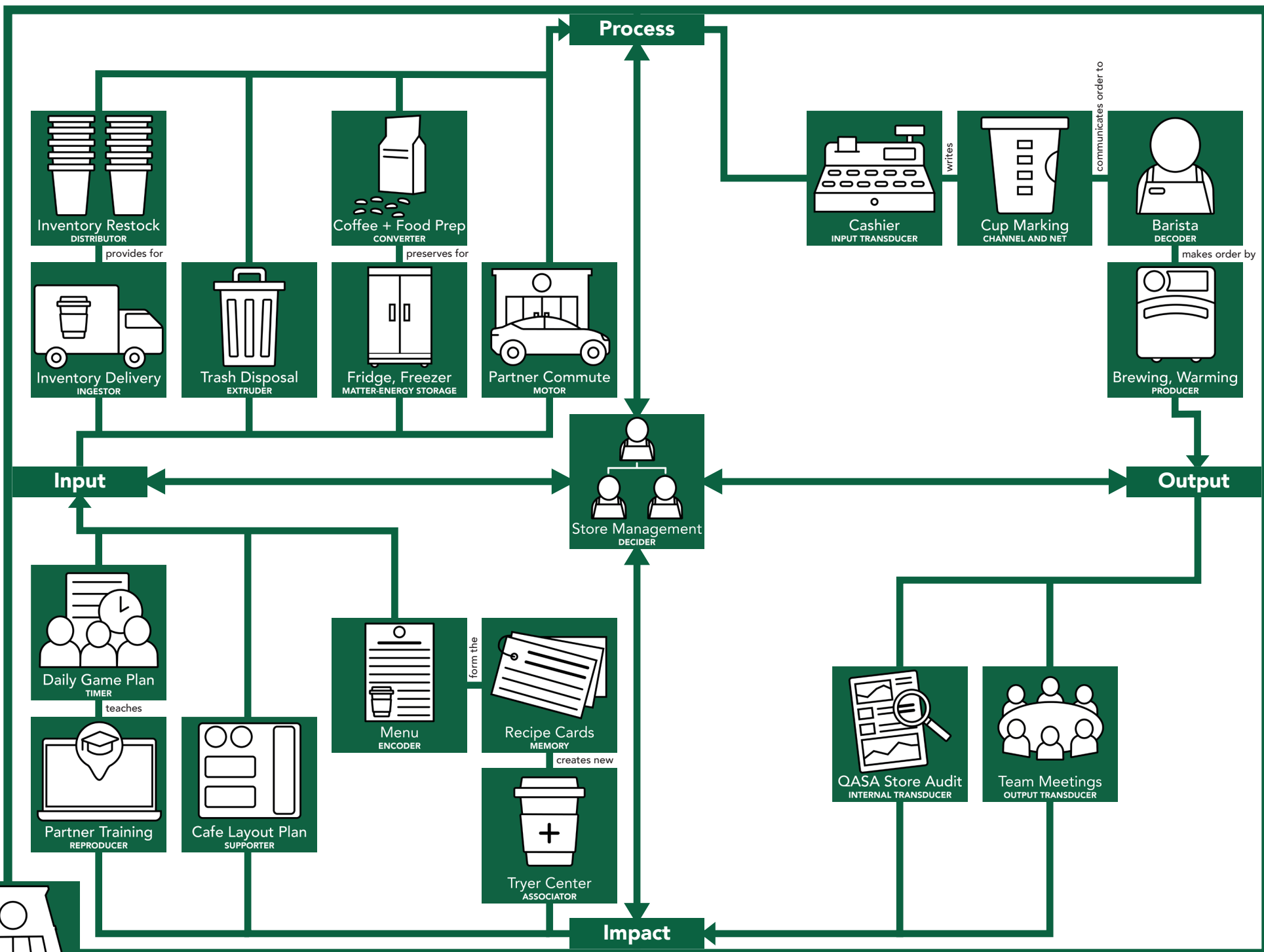Occupational Therapist from Philadelphia, PA

Culture Systems

1. Familial
2. Philadelphia
3. University Student
4. World Travel
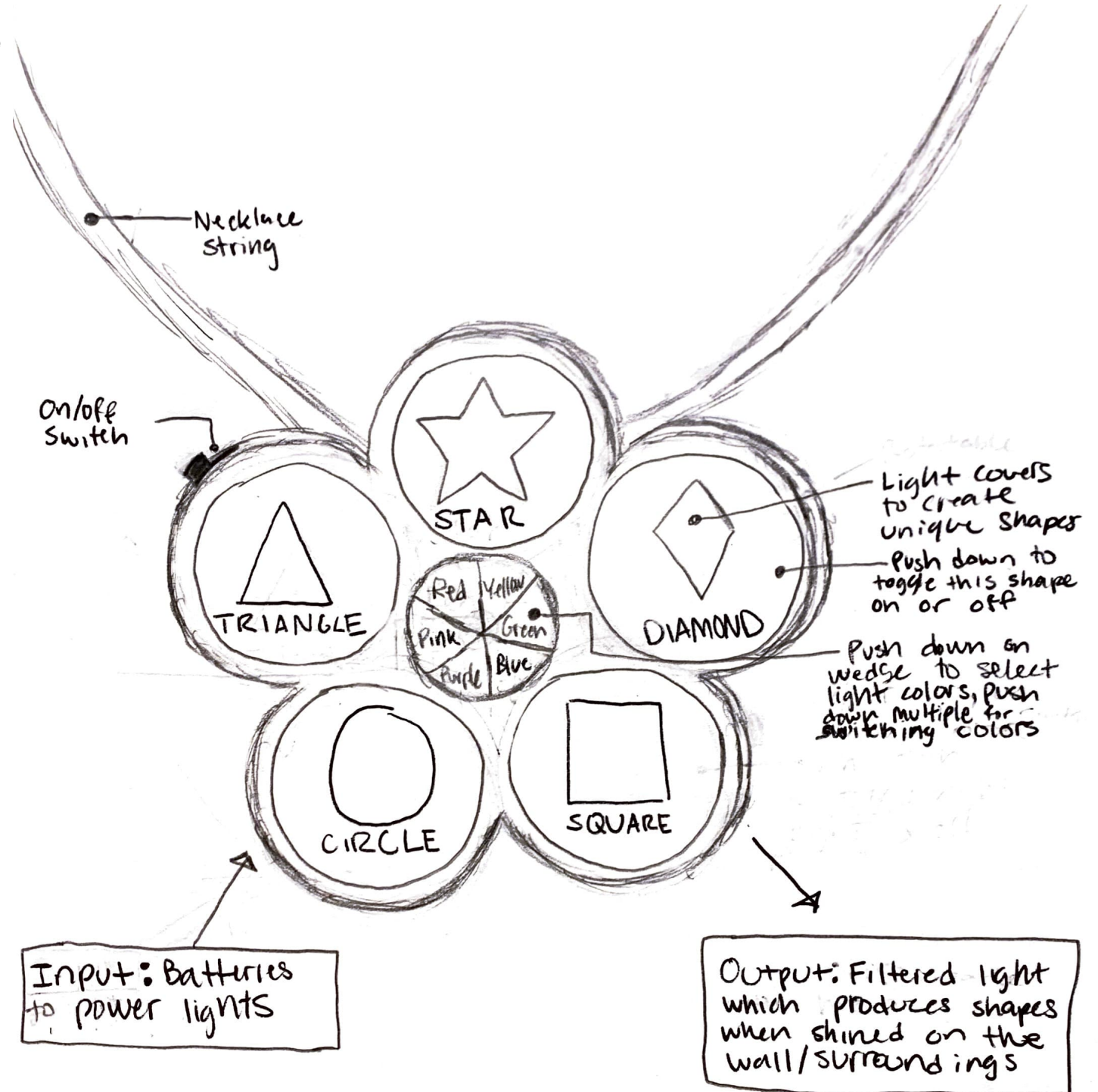5. Washington DC
6. Occupational Therapy

Relationship Systems

1. **Parents-** Mom and Dad
2. **Siblings-** Lia, Becca, Victoria
3. **Childhood Friend-** Rachel
4. **OT School Friends-** Jen, Abby, Sidney
5. **DC Friends-** Bri, Ryan
6. **Husband-** Lewis

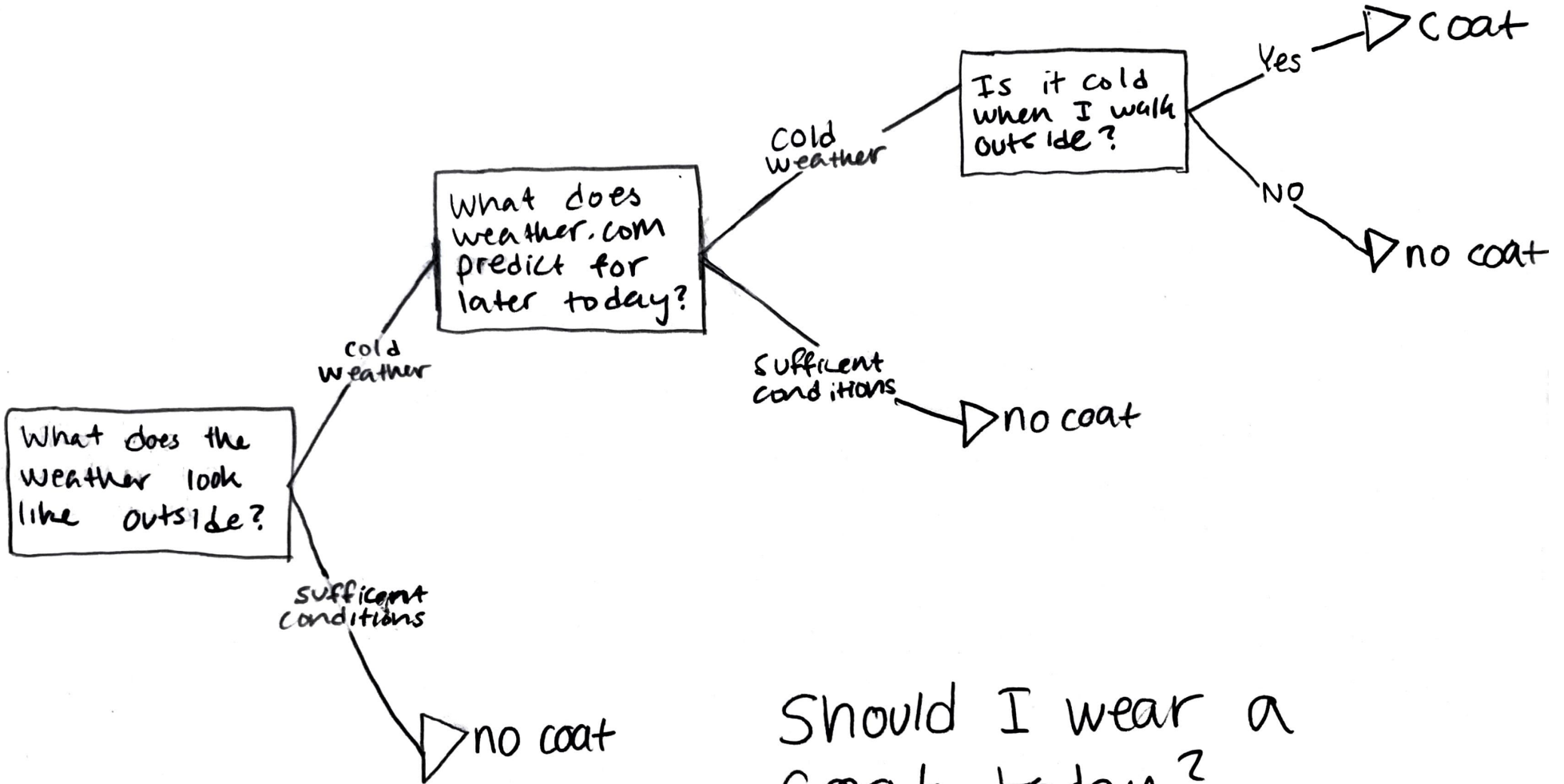# Starbucks Store Operations System Diagram Charles Andrews

Process

Input

Output

Impact

Inventory Restock
DISTRIBUTOR

provides for

Coffee + Food Prep
CONVERTER

preserves for

Inventory Delivery
INGESTOR

Trash Disposal
EXTRUDER

Fridge, Freezer
MATTER-ENERGY STORAGE

Partner Commute
MOTOR

Cashier
INPUT TRANSDUCER

writes

Cup Marking
CHANNEL AND NET

communicates order to

Barista
DECODER

makes order by

Brewing, Warming
PRODUCER

Store Management
DECIDER

Daily Game Plan
TIMER

teaches

Partner Training
REPRODUCER

Cafe Layout Plan
SUPPORTER

Menu
ENCODER

form the

Recipe Cards
MEMORY

creates new

Tryer Center
ASSOCIATOR

QASA Store Audit
INTERNAL TRANSDUCER

Team Meetings
OUTPUT TRANSDUCER

Building Entrances
BOUNDARY

4. Site and Situation as Systems (Field Work)

Necklace string

On/off Switch

STAR

TRIANGLE

DIAMOND

Red | Yellow
Pink | Green
Purple | Blue

CIRCLE

SQUARE

Light covers to create unique shapes

Push down to toggle this shape on or off

Push down on wedge to select light colors, push down multiple for switching colors

Input: Batteries to power lights

Output: Filtered light which produces shapes when shined on the wall/surroundings

Should I wear a coat today?

Charles Andrews

7. Semiotic Systems: Symbolic Polarization in Politics

Color: Red v. Blue

It was not until the 2000 presidential election that the modern distinction of Republicans as red and Democrats as blue became a standard. While it may seem to Generation Z that this standard has always been in place, most news networks in the early 20th century associated Republicans with blue and Democrats with red. This likely stems from the civil war era where blue pencils were wildly used to represent Confederate forces and red marked Union forces. As modern election map graphics developed on news networks in the 20th century, some networks chose to swap the color distinction every four years so as to not show bias. In the wake of the Al Gore vs Bush presidential race, networks agreed on a mutual color distinction, with red representing Republicans and blue representing Democrats, to maintain consistency and prevent confusion amongst viewers. Following this contested election, the standard was cemented as Americans began regularly using the terms red states and blue states in conversation.

Symbol: Elephant v. Donkey

Unlike the color distinction, the animal symbols that denote our modern political party have been widely used since the late 19th century. The donkey symbol after the 1828 election where democratic candidate Andrew Jackson was called a "jackass" by his opponents. Instead of denying his nickname, he leaned into and included it on his campaign posters leading up to his victory. The Republican symbol of the elephant may stem from the expression during the civil war of "seeing an elephant" which was used by soldiers in reference to seeing combat. However, these symbols were cemented only when political cartoonist Thomas Nast featured them in his popular works in the 1870s. By the 1880s, the two symbols became standard for other cartoonists in the space.
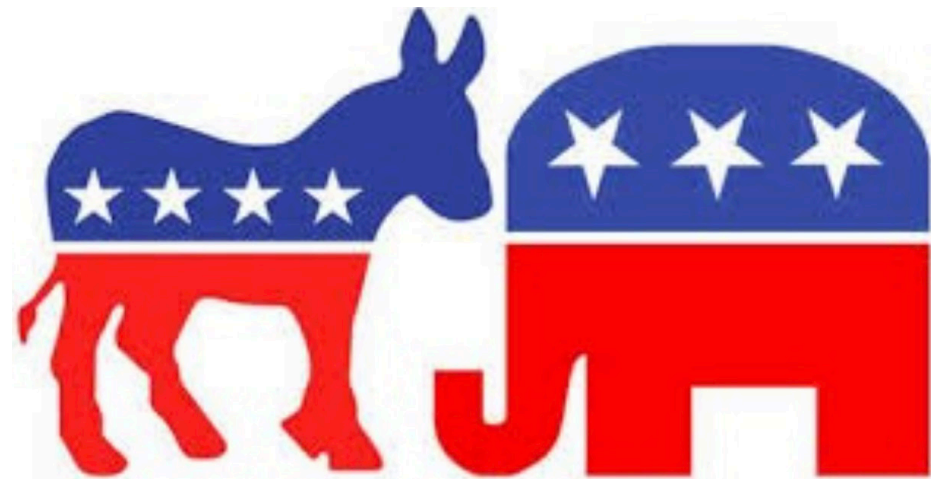
Info Source: https://www.washingtonpost.com/news/the-fix/wp/2016/11/08/red-vs-blue-a-brief-history-of-how-we-use-political-colors/

Info Source: https://www.history.com/news/how-did-the-republican-and-democratic-parties-get-their-animal-symbols
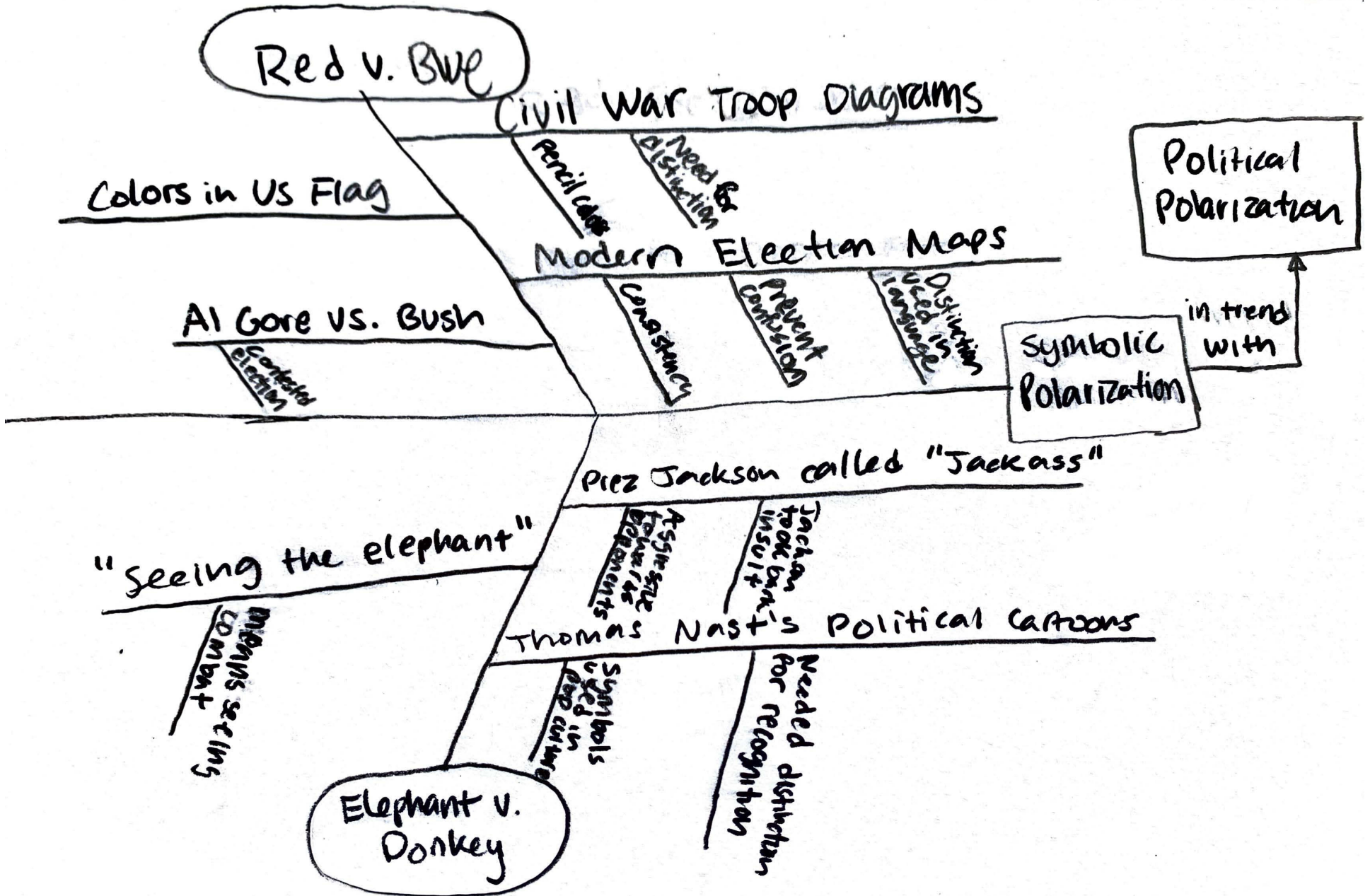
8. Life as Network, Web, Mesh...?

Emotion Detector

As human beings, the actions we choose are based on how we are feeling in the moment. They dictate how we think about ourselves, others, and the world around us. While body and verbal language help us naturally discern the emotions of others, it can be difficult to judge the accuracy of your readings on others, and sometimes even yourself.

A tool that could discern this information would allow others to better empathize with those around us and understand the cause of their decisions and actions. The emotion detector application for iPhone uses real time audio and picture to determine the current percentage-based breakdown of a target individual's emotional status. The human experience is inherently complex, which is why the detector understands your feelings eb and flow between a range of positive, negative, and neutral emotions at any given moment.

In addition to improving one's ability to relate and communicate effectively with those around them, this application aids in research and therapy. The data provided enables therapists to better understand their patients when they find it difficult to fully express their feelings with words. Researchers are able to obtain clear and reliable metrics about test subjects to improve their studies for usability, mental health, and other human based research areas.

THE EMOTION DETECTOR...
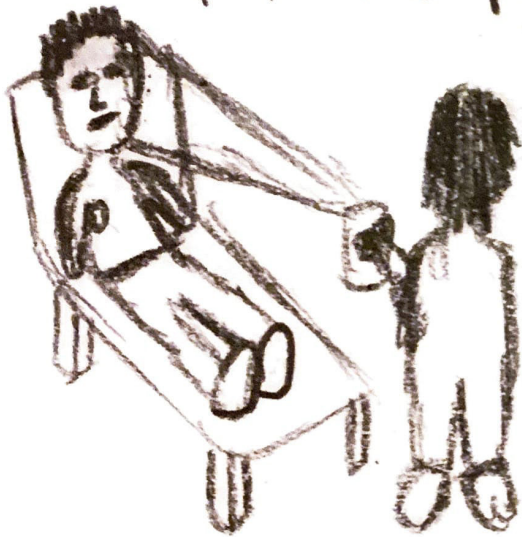
For human centered research

For Therapy

For friends... and yourself

For understanding the complexities of the human experience

9. Integration of Valuable Difference, Preservation of Requisite Variety

WEA Analyzer Amazing Machine

WEA test schedule and
any possible changes

Presence of an
oncoming disaster

When a WEA is sent
and its content

Public's reaction
to the WEA

Operators' intentions
when sending WEA

Brain

Compares the sent
WEA to the factors of
causation to determine if
a mistake has occurred
and the quickest, most
effective course of
action to correct it

Sensor for
data inputs

Stick for for
mobile outputs

Belly

Holds the fuel for operation

Obtains fuel through HEMA
to ensure informative and
accurate WEAs

Releases unnecessary
information for its
investigation to improve
running time and make
room for more data

Legs to physically move for
investigation into the disaster,
the public's reaction, and the
authorities that sent the alert

Mouth to voice that an error
has occured and how that error
might best be resolved in the
interests of the public

Reading Responses

5 Essays

How Do You Design Response Essay

The basic archetypal two-step process begins with an input problem, which is then transformed to an output solution. This process can be infinitely zoomed in or zoomed out on, depending on the complexity of the problem or variety of potential solutions. The transformation to an output usually involves first a breaking down of the situation into parts, known as analysis, then a reconstruction of those parts into a well-structured and holistic solution, known as synthesis. In the analysis of a complex problem, breaking down the problem into sub problems can provide a designer with specific elements that they can study in order to formulate sub solutions that work together to solve the overall problem at hand. It might be also necessary to diverge either of these phases into a broad study of multiple areas or potential solutions in times when there is no clear direction for a project.

The analysis phase begins by asking general questions about the human factors and context, which are researched and empathized with to determine the specific requirements of the user base. These requirements guide the synthesis phase, creating a jumping off point for the designer to begin outlining potential roads to a comprehensive solution. As the designer better understands the major elements that are successful, they can pick and choose the best aspects to create an optimized prototype. Throughout this process, especially at the close of synthesis, it is important to verify that the solution is solving the problem by considering these elements in terms of each other.

A point of contention is when the analysis and synthesis occur throughout the process. Design by nature is solution oriented. Thus, synthesis could potentially begin at the start of the process to a small capacity, gradually expanding as the analysis phase draws to a close, as seen in Newkirk's diagram. A focus on solutions and problems concurrently can help uncover new insights by forcing the designer to shift between these seemingly conflicting mindsets. Having this interconnected approach can help to consider unexpected elements that might not be obvious in a sequential approach. Overall, it seems that designers choose to start from a broad vantage point, then progressively become more specific as they begin to get a firmer grasp on the context and requirements for the solution.

The design process is not unique to the traditional areas of graphic design and interaction design. It also has foundations in parallel industries such as engineering, software development, and business. The scientific method has inherent similarities with the design process. The analysis stage mirrors the process of coming to a hypothesis from a theory. The synthesis stage mirrors the use of observations from the experiment to come to a formal conclusion that responds to the hypothesis. With this conclusion, beginnings of a new experiment are set in motion, just as after synthesis a designer is ready to develop the next iteration by refining their work. The design process is recursive, meaning that it a constant cycle back to the areas within the process that need iterating and improvement. Feedback and testing are integral to determining where flaws exist within the framework of the project.

How Do You Design Response Essay Part II

Charles' Design Praxis

This past summer, I was tasked with designing a website for a small business called Language University that provides foreign language programs for young children. When I came into the project, the business owners were unsure of where they needed to take the website organizationally and content-wise. After learning about the company's move towards digital programming in light of COVID-19, I decided that allowing their digital content to tell the story of their brand would be integral to communicating their values and purpose authentically. I also streamlined the registration process for parents, which was important for preparing the business for their fall semester programming.

After presenting my vision for the site, the business owners agreed that the goals I outlined were integral to moving their previously in-person programs to the digital space. However, when I presented some preliminary changes to the landing page, one of the business owners expressed concern about changing the layout and removing some of the text-heavy content that he had written for the site. From this experience, I learned that although the client may say they are comfortable with change, they usually are not in reality. It is the job of the designer to explain their strategy behind their design decisions so that the client can become comfortable with the change. Instead of beginning the process of redesigning the website on my own, I should have discussed more concrete ideas about the website layout prior to implementing so they felt more on the same page.

Vicky's Design Praxis

Most of my professional career has been in farming and gardening and event planning. When working with clients in these settings (farm and garden consulting and large scale events/weddings) clients often have either very specific ideas of what they want, or they have no ideas whatsoever. The latter case is almost more difficult at times; sometimes (though rarely) you end up creating something that does not match the idea of what the client wanted, though they weren't able to articulate it before. Only in seeing, or beginning to see, are they able to begin to envision what they want. In these settings, it would be advantageous to be able to spend more time with a client, or to be able to conduct some type of reconnaissance to understand the client's desires better.

A key component of designing garden spaces and wedding venues is to be able to communicate your decision making with the client. Especially for gardens—spaces that will be used and that will remain for years—it is important that the designer explains the cultures of certain plants, or microclimates to the client, so the client can build on the space in a responsible and knowledgeable manner in the future. Designing for events and weddings is very different— you are often curating a space that will be used for one day only. In this case, I still think of the design work in terms of longevity, but rather longevity of whatever gets used in the space: chicken wire instead of floral foam, local flowers instead of flown flowers, timeless vessels that can be used year after year, rather than following trends.

A Comparison of Praxis

The majority of the overlap between our design praxises lies in our issues with communicating with the client. When designing, it is integral to understand the point of view and vision on the part of the user and client. The client is concerned with process efficiency, cost, feasibility, and other business-centered factors. The user is concerned with the usability, effectiveness, and overall quality of the solution to their problem. In order to create a successful output, the designer must find the middle ground between the user and the client to meet the demands of both parties. In Charles' praxis, he discussed his struggle with understanding the vision of Language University for their new website launch. When the organization lacks direction, it does not mean you are free to design as you wish, but that you need to help the organization find its direction. This is achieved by accompanying your design process with a constant stream of communication with the organization so they understand the value behind your decisions as you progress through the project. In Vicky's praxis, she discussed the difficulty of grappling with client expectations and a designer's style or methodology. Understanding the client's desires and behavioral tendencies become one of the essential considerations before agreeing to work with clients. This orientation process allows the designer and client to better understand each other before having to commit and in turn creates a space where the designer feels they have creative freedoms and clients form trust with the designer.

How Do You Design outlines the design process for IDEO, an international design and consulting firm. Their process begins with the observation of the consumer's experience, allowing the designer to better understand the user and how the organization's current solution is performing. With this new understanding, the organization brainstorms to create an expansive array of preliminary ideas about the problem, solutions, or other areas related to the topic. The final output is rapidly prototyped, refined, then implemented in the last three phases. Throughout each step of this process, it is important to relay the findings and deliverables to the organization so they understand where their sponsored project is heading. The communication line between the designer and the organization allows the designer to close paths that will not work in context. This "dwindling down" directs designers further down the paths that will lead them to the optimal solution for both the user and the organization.

1. Observation
IDEO's cognitive psychologists, anthropologists, and sociologists team up with corporate clients to understand the consumer experience.

Some of IDEO's techniques:

Shadowing Observing people using products, shopping, going to hospitals, taking a train, using their cell phones.
Behavioral mapping Photographing people within a space, such as a hospital waiting room, over two or three days.
Consumer journey Keeping track of all the interactions a consumer has within a product, service, or space.
Camera journals Asking consumers to keep visual diaries of their activities and impressions relating to a product.
Extreme user interviews Talking to people who really know—or know nothing—about a product or service, and evaluating their experience using it.
Storytelling Prompting people to tell personal stories about their consumer experiences.
Unfocus groups Interviewing a diverse group of people: To explore ideas about sandals, IDEO gathered an artist, a bodybuilder, a podiatrist, and a shoe fetishist.

2. Brainstorming
An intense idea-generating session analyzing data gathered by observing people. Each lasts no more than an hour. Rules of brainstorming are strict and are stenciled on the walls.

Defer judgment Don't dismiss any ideas
Build on the ideas of others No "buts," only "ands."
Encourage wild ideas Embrace the most out-of-the-box notions because they can be the key to solutions.
Go for quantity Aim for as many new ideas as possible. In a good session, up to 100 ideas are generated in 60 minutes.
Be visual Use yellow, red, and blue markers to write on big 30-inch by 25-inch Post-its that are put on a wall.
Stay focused on the topic Always keep the discussion on target.
One conversation at a time No interrupting, no dismissing, no disrespect, no rudeness.

3. Rapid prototyping
Mocking-up working models helps everyone visualize possible solutions and speeds up decision-making and innovation.

Some guidelines:

Mock-up everything It is possible to create models not only of products but also of services such as health care and spaces such as museum lobbies.
Use videography Make short movies to depict the consumer experience.
Go fast Build mock-ups quickly and cheaply. Never waste time on complicated concepts.
No frills Make prototypes that demonstrate a design idea without sweating over the details.
Create scenarios Show how a variety of people use a service in different ways and how various designs can meet their individual needs.
Bodystorm Delineate different types of consumers and act out their roles.

4. Refining
At this stage, IDEO narrows down the choices to a few possibilities.

Here's how it's done:

Brainstorm in a rapid fashion to weed out ideas and focus on the remaining best options.
Focus prototyping on a few key ideas to arrive at an optimal solution to a problem.
Engage the client actively in the process of narrowing the choices.
Be disciplined and ruthless in making selections.
Focus on the outcome of the process—reaching the best possible solutions.
Get agreement from all stakeholders. The more top-level executives who sign off on the solution, the better the chances of success.

5. Implementation
Bring IDEO's strong engineering, design, and social-science capabilities to bear when actually creating a product or service.

Tap all resources Involve IDEO's diverse workforce from 40 countries to carry out the plans.
The workforce Employees have advanced degrees in different kinds of engineering: mechanical, electrical, biomechanical, software, aerospace, and manufacturing. Many are experts in materials science, computer-aided design, robotics, computer science, movie special effects, molding, industrial interaction, graphic and web information, fashion and automotive design, business, communications, linguistics, sociology, ergonomics, cognitive psychology, biomechanics, art therapy, ethnology, management consulting, statistics, medicine, and zoology.

How Do You Design **Pg 65**

Toward a Model of Innovation Response Essay

As recently as the 1980's, the business world was primarily focused on enhancing the quality of their products. Business tools such as statistical process control, TQM, and Six Sigma management have developed from this struggle for supreme quality within competitive markets. Unlike quality, which focuses on positioning a product as the best tool within a preexisting context, innovation breaks from these ridged boundaries. Today, the arena for competition has moved from the confines of quality to innovation, forcing the business world to move into risky, unchartered territory. Venturing to new paradigms means accepting uncertainty in order to uncover variety, which is the enumeration of options a system has available to explore. Variety provides opportunities to create novel versions of a preexisting artifact that move the industry and mankind forward towards more optimal tools and solutions.

In the model of innovation, designers working with Alberta College of Art and Design have created a concept map that engages viewers in the discussion of what makes innovation possible and where it originates from. In viewing the concept map in the context of an existing project, the model can serve as a guide towards creative ingenuity. The vertical axis describes a cyclic process of innovation which stems from the decay of usability or ingenuity in a solution and a change in the community of users or society. This leads to pain using the artifact that can be studied and used to come to a more formal definition of the problem. With this definition in place, research uncovers insights that reveal new areas for the artifact to move into that might better solve the user's problems. Insight informs prototypes of a solution formed around the designer's acquired knowledge. These prototypes can be tested to determine if they successfully solve the needs of the user. Feedback is essential to this vertical axis, providing the freedom to revisit previously studied areas of the project in order to redirect the innovation process towards a more productive course of action.

The horizontal axis emphasizes the role of the individual within innovation. The preparation of the individual comprises luck, as well their immersion in the artifact and its context. This preparation puts the individual in the position to uncover new insights using their acquired knowledge. Through this non-linear concept map of innovation, teams can determine their next course of action and how they might move in a direction that breaks from convention.

Eventual Design for an Emergent World Response Essay

Design amongst living systems is an impossible task. In the modern age, we are constantly being reminded of the failures within the systems that are meant to help us- the biases within the criminal justice system, the government's failure to provide adequate services in the midst of a pandemic, and Facebook allowing bots and hate speech to circulate without censorship. As designers, we are told to enter within these systems, study them, and then formulate a solution that will solve these complex, multifaceted issues. Our living systems have become bigger than all of us, let alone one designer. How is one designer meant to analyze the problem? We focus on the ambiguous notion of the "other" known as the users. However, how could example users, described through a few short personas, provide us with enough information to fully understand the people that interact with the systems we design for? As technological disasters increase in frequency, mankind continues to ignore the feedback by oversimplifying it and moving on.

On January 13, 2018, Hawaii citizens were informed via a wireless emergency alert that a "ballistic missile threat" has been detected was heading for the islands. After the 38 minutes of pure panic, the citizens were told that the alert was a mistake. Upon further investigation, it was discovered that the error was caused by systemic process failures within the Hawaii Emergency Management Agency and software that did not clearly label the distinctions between a live alert template and a demo alert template. Design decisions within HEMA's protocol and the wireless emergency alert software was at fault for this human suffering. Technology was the cause of human suffering. While designers may enter into a project with an idealistic attitude, not fully thinking through their process, it is important to understand the impact their role in the project can have. Decisions have consequences.

The goal of eventual design will be creating interventions that are constructed from a solid, collaborative understanding of the problem and living systems in play. Instead of limiting their scope, designers need to work in a team to consider both the larger picture and the details. I was particularly moved about the example presented in the reading about the impact western technology has had on Native Americans. After the industrial revolution, our consumeristic society stopped thinking through the larger impact of our advancements. The factories focused on lowering costs of their products, without consideration for the wellbeing of their fellow man- the workers and consumers. Consumers gave industries the benefit of the doubt. Those who dissented, such as the Native Americans, were silenced and forced to comply. We are at a turning point where designers have the audacity to think through complex problems and try to make good on the errors of their predecessors. Eventual design must see technology for more than just the aesthetics and functionality, taking into account ecological, social, and societal impact. "I cordially invite you to enter," as the article concludes.

Web of Life Response Essay

Exploration into systems first began with the study of organisms in terms of their parts and communities, as *Web of Life* Chapter 3 notes. Studying how these parts and communities are connected gave rise to a focus on the relationships within these systems and how they unify aspects into a whole. Today, this research has led to Bertalanffy's General Systems Theory, which can be applied to all scientific areas and beyond. Systems can be viewed in varying levels of complexity, with specific properties describing each level. These emergent properties are tied to a specific level of a system and are not applicable at lower or higher levels of the system due to the change in context.

An example of this concept is the taxonomic system of classifying life. The top-level view of this system is Domain, with the classifications of Archaea, Bacteria, and Eukarya describing the differences in properties between each different branch. The properties that are important at this level include the number of cells that make up the organism (single vs multicellular), the existence of a cellular membrane, and the type of rRNA. Eukarya possess the properties of being mostly multicellular, possessing a cell membrane, and having rRNA specific to Eukarya. When this system is analyzed from one level below Domain, which is Kingdom, new properties emerge to describe this more specific context. The Kingdom classifications include Animalia, Fungi, and Plantae, each with their own unique properties that call for their distinction at this level of observation. Focusing on the cellular membrane at this level is no longer important because it is a property that does not define a specific classification at this level. Instead, these groups are divided based on properties such as having or not having a cell wall, the organelles they possess, and the processes in which nutrients are acquired.

Systems thinking requires one to see knowledge not as a building that is constructed from a foundation of fundamentals, but as an interconnected network of relationships between concepts. So, for instance, when analyzing the system in which a wireless emergency alert is sent, no one aspect should be seen as more important to the success of the system. Instead, each aspect of the process, from the method in which the operators are notified of the disaster, to the software used to send out the alert, to the actual alert itself are important equally. Ensuring the success of one aspect will not necessarily mean success for the other parts.

There is an inherit similarity between processes and systems. This concept can be thought of in terms of the class structure within object-oriented programming. In Java, an interface consists of underlying classes, each with their own variables fluctuating as a result of their distinct methods, which are functions specific to their class. If we see classes and interfaces as two levels within the overall system, classes are a structure type with variables, analogous to properties. Variables change through their specific methods, which are attributes that describe processes such as adding or subtracting, should the class represent an integer. The processes that exist within a class inherited by an interface are descriptive of that interface indirectly by relationship.

Field Studies

10 Reports

1. Murder Mystery Party Field Study

Form

Murder Mystery Party is a competitive TV party game in which players answer trivia questions in order to garner the most points and win the game. Each player submits their answers to the questions via a phone, tablet, or computer and their responses are displayed on the television as the game progresses.

Features

When a player connects to the game via their individual device, they are connected to the central game and thus able to interact with the game to earn points.

If a question is answered incorrectly, the player is at risk of elimination if they lose a mini game against the other players who got the question wrong. If a question is answered correctly, the player is safe for the round and gains points in the form of fake money.

The non-eliminated player with the most points after a series of trivia questions, is given an advantage in winning the game in the final trivia challenge sequence. If all players are eliminated from the game after a series of trivia questions, the final trivia challenge sequence does not occur and thus no one wins the game.

If a player answers a question incorrectly in the final trivia challenge sequence, they do not move forward and thus have a worse chance of winning.If a player answers a question correctly in the final trivia challenge sequence, they move forward and thus have a better chance of reaching the end of the board and winning the game.

Artifact

The artifact is a digital board game meant for group entertainment.

Systems

Device Synchronization: used to send each player's response from their individual devices to the centralized game

Human Computer Interaction: players must analyze the question presented by the television and input their response via their individual devices

Game Sequence: Each game follows a consistent pattern of events starting with the initial trivia questions and ending with the final trivia challenge

Insights

The trivia questions could be restructured to follow a specific theme
(ex: Harry Potter themed Murder Mystery Party)

Device synchronization could be utilized to create a new interactive board game
that is displayed on a TV and interacted with via individual devices
Game could analyze what categories of trivia questions the group or individuals are
best and worst at

The game could be changed in scale to be a nationwide trivia game. Viewers would
respond to the questions from their devices and their responses would determine
their ranking on a national scale

Device synchronization could be repurposed to allow viewers of political debates to
interact with what the presidential debates to help guide the discussion

Interventions

Change the type of questions so that they are based around a single topic

> This would create a more specific game that would only be suited for
> groups that like the single topic. If a member of the group does not know
> the single topic, then the game would practically not be playable for them.

Device synchronization could be utilized to allow individual players to complete
their turns in a TV game such as scrabble or monopoly

> This would allow groups to play board games from their couch instead of
> the usual kitchen table. This would create a less intimate game because
> players no longer will have to stare at each other around the table, but
> instead will be staring at the TV or their individual devices.

As players respond to the questions, Murder Mystery Party will now gather data
about the types of questions players are answering questions correctly. At the end
of the game, stats will be displayed about what player(s) were best and worst at
each of the category of questions.

> When players see the new stats at the end of the game, they will have
> fun looking at how their friends preformed in the game. They will be able
> to compare their strengths or weaknesses with each other in a low stake
> setting.

Instead of having the trivia game exist as an app on your television, the trivia game
would exist as a television show that airs weekly. Players would connect to the
television show by entering a code on a website, as players currently do for Murder
Mystery Party.

> By changing the scale of the game from a small group of people to all
> viewers of the TV show, it would make the games less personal. Viewers
> might take longer to submit their questions because of lagging in the
> television show. People may lose interest in the game because there is
> too much competition and thus it may become uncommon to win for the
> average viewer.

Device synchronization style of play could be used to allow viewers of presidential
debates to connect to the debate and answer live polls about what the candidates
are saying or submit their own questions.

> This would allow viewers of debates to interact with the programming
> more. While there is the chance that this could become too much a
> distraction, it could allow citizens to guide the course of the debate and aid
> in understanding how the nation views the candidates' performance.

Connect via debate.com by entering code

Join the Conversation Code: ABCD debate.com

CNN Debate

Interactive Debates
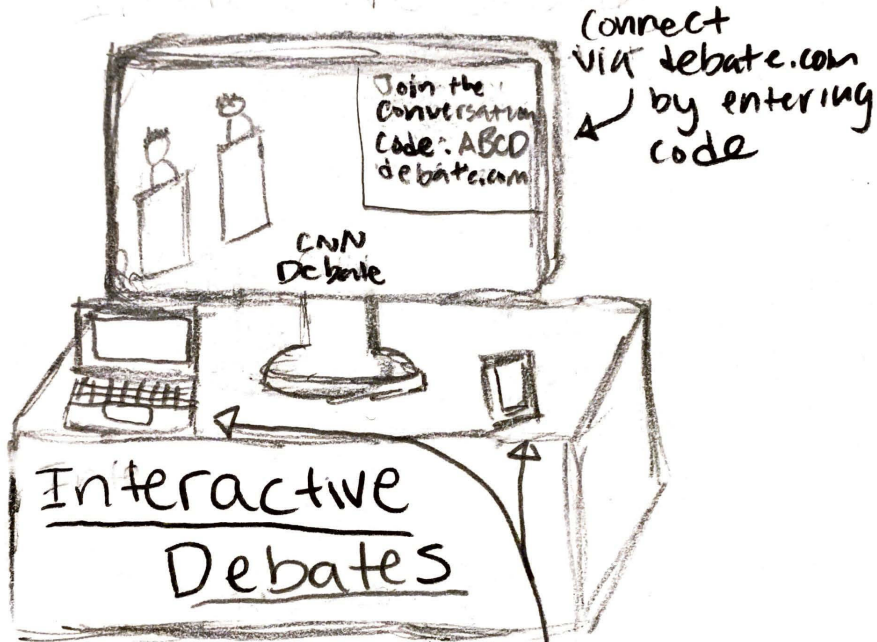
Debate viewers respond to the events of the debate on their individual devices (laptop, phone, tablet, etc)
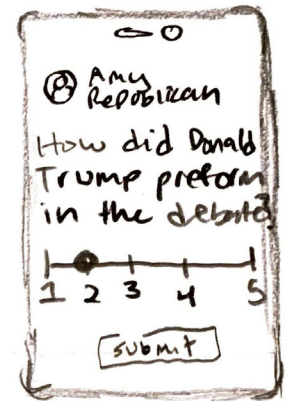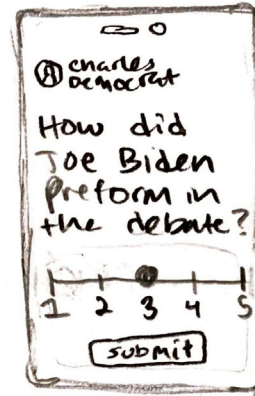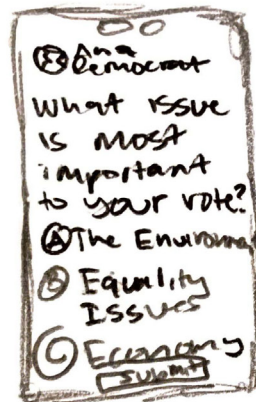
Viewers submit their responses during the debate to help guide the course of the event and show real time data.

2. Apple CarPlay Field Study

Form

Apple CarPlay is a car software which allows an iOS device to be plugged into a car head unit. It allows users to view and semi-operate the leading navigation, music streaming, messaging, and phone applications. It is currently licensed by all leading car manufacturers.
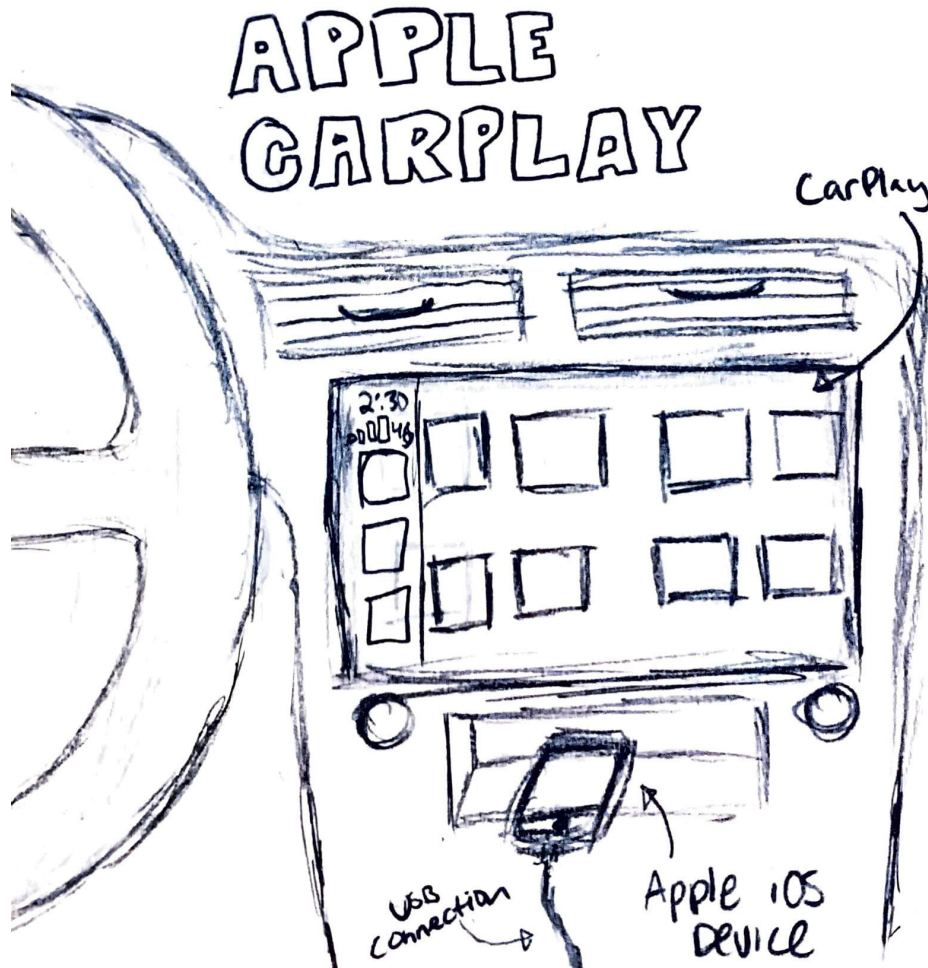
Features

When an Apple iOS device is connected to the car's USB port, the phone's data is projected onto the head unit via the CarPlay software

When a user selects a destination in a navigation app such as Ways, their trip is available on CarPlay

When a user begins playing music, audiobook, or podcast, their media is broadcasted on the car's audio system

When a message or call is received, is promoted with an opportunity to engage with the communication

When the iOS device is disconnected, CarPlay no longer has access to the phone's data

Artifact

The artifact is a head unit software that allows connection with iOS devices.

Systems

USB Connection from Car to Mobile Device: process of connecting a mobile device of any type to the car for use of data transfer to the car

Car Head Unit Console: runs and projects CarPlay software only when an eligible IOS device is connected via USB

Car: the larger system that the user operates to move through space, the place in which the head unit exists

CarPlay: an Apple software that uses the data transfer of an eligible iOS to project the current media in use for in-car interaction by the user

Insights

Ordering food delivery via third party CarPlay so that it arrives when you get home

Ordering food or beverage in a drive-thru via a third party CarPlay application that opens when the car joins the line

Road trip travel manager application

Interventions

GPS tracking allows CarPlay third party application to plan out a food delivery so that it arrives when the user gets home

>   Would allow the user to have warm, freshly made food available as soon as they get home from work or school
>
>   User would not have to worry about the food arriving at their house before them

CarPlay projects a drive-thru ordering application on its screen when it detects that the car has joined the line by driving over a sensor

>   User is able to begin ordering in a drive-thru as soon as they join the line
>
>   Allows ordering process to be completed faster because user no longer needs to wait for cashier window or verbally order
>
>   Danger inherit in focusing on a screen while driving

GPS tracking allows third party CarPlay application to determine where you are in your road trip

>   Allows user to organize their various segments of their trip and immediately begin the navigation trip for the current day when they enter the car

CarPlay Drive-Thru Experience

STARBUCKS

DRIVE-THRU
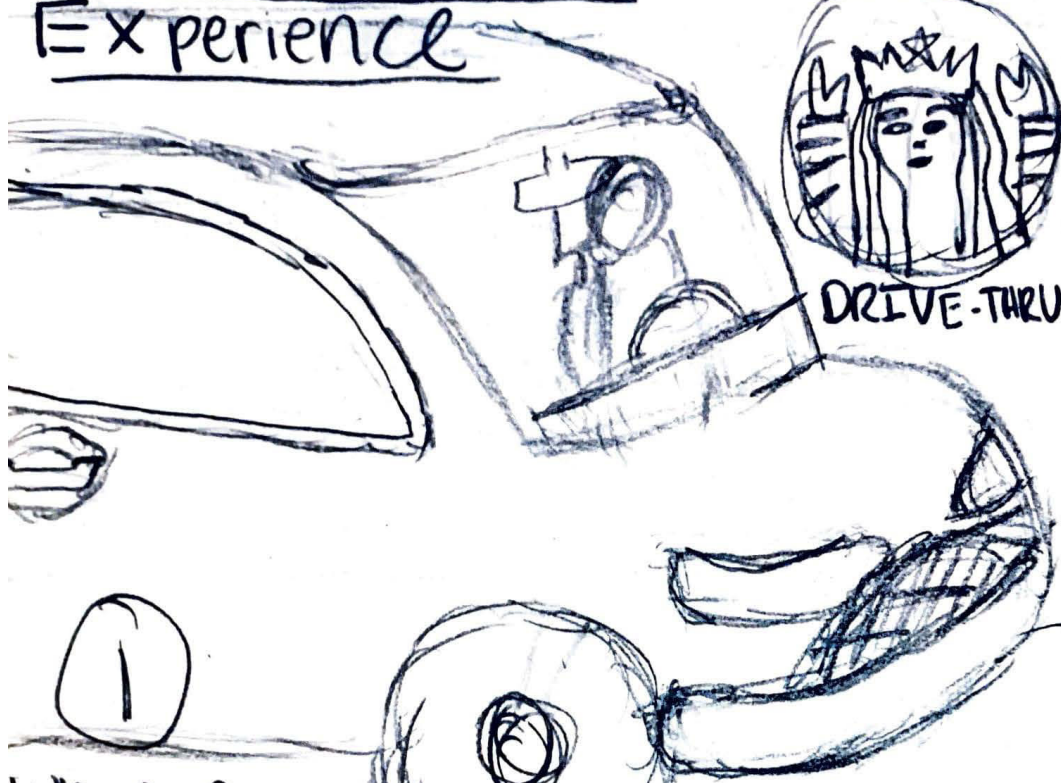
(1)

When a driver drives over the sensor, CarPlay switches to an application that allows the user to order and pay for their food or beverage without speaking with workers.

sensor

(2)

UI for Starbucks Drive-Thru CarPlay application

Mocha Frappucino
- [ ] Light Ice
- [ ] Add a shot

Add

STARBUCKS

Order

1 Mocha Frap | $5
1 Blueberry Muffin | $3

Order Total: $8

Pay & Confirm

Apple Pay

Debit

Credit
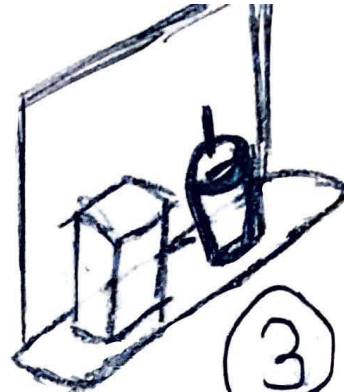
(3)

The customer's order is ready for them at the order pick up window. Customers are able enjoy their beverage or food faster by not speaking with workers.

3. Digital Picture Frame Field Study

Form

Digital picture frames display a variety of beloved memories from a digital photo library so that they can be enjoyed throughout the day. Using an integrated mobile app, users upload the albums or individual photos they want to appear on the frame.
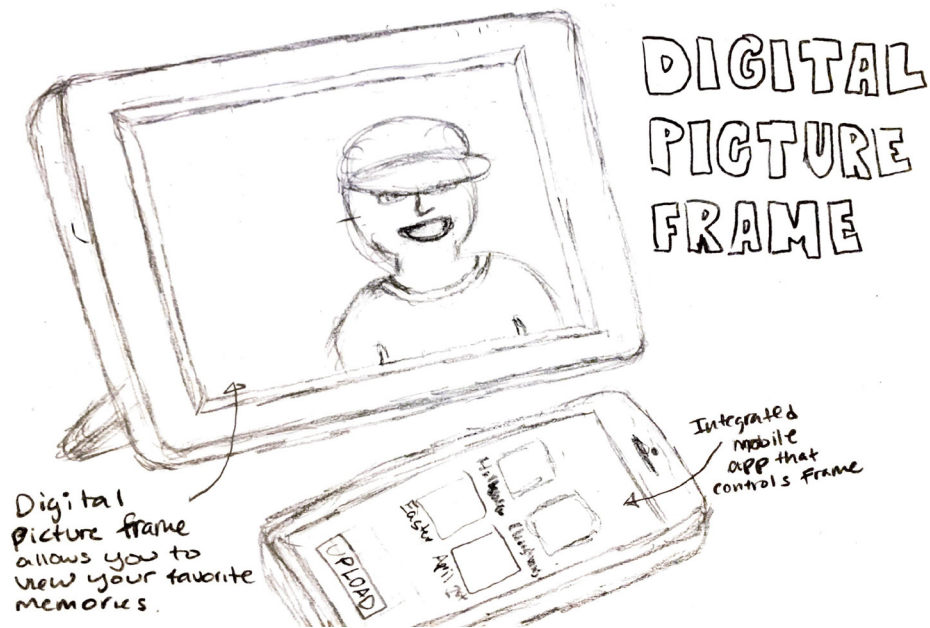
Features

When a mobile device is registered with a picture frame, personal photos can be uploaded to the frame to display throughout the day

When specific photos or albums are chosen in the mobile app, the frame projects your selected images

If a viewer sees a photo in the frame they want added to their own digital photo library, they can send the photo to themselves via the frame UI

Artifact

The artifact is a digital device used for displaying photos.

Systems

Digital Picture Frame: the device which displays the desired photos of the user

Integrated Mobile App: allows user to control the photos being displayed in the moment or throughout the day

Home: the place in which the frame is permitted to exist, inhabited by the device's owners

Insights

Digital picture frames of varying sizes (large dimensions and small) that are interconnected so that users can have their photo library on display throughout their entire home

Digital picture frame becomes a stationary hub for the internet of things throughout a home

Digital picture frame that can sense the people in the room and play only photos from events that they were involved in

Interventions

Digital frames are made in larger formats so that they can fill up more space for use in hallways, multiple frames are connected so that the same photo library is on display in each frame

> Allows user to control multiple frames via one app and possibly customize the photos for certain rooms

> Digital frames can become larger and more easily seen throughout the home due to their increased size

Digital picture frame becomes a stationary device that is able to control the various states of the internet of things within the home

> Guests to the home who are unable to control the internet of things within a home can do so without having to ask to use a resident's personal device

> Children without devices could control the internet of things without having to ask their parent

> Password to access internet of things controls withing the frame would protect against unwanted changes

Digital picture frame has a room scanner that senses who is in the room and displays only photos that are meaningful to the discovered people

> Allows photos to more personal to the people viewing them

> Allows for curated slideshows without effort on the user's part

> Privacy issues involved with knowing the identity of the people in the room

Invention

Room Scanning Digital Picture Frame

The frame scans the room to discover who is there. With this information, the frame shows photos curated to those present.

Enjoy curated pictures that allow everyone to relive memories in a meaningful, group manner.
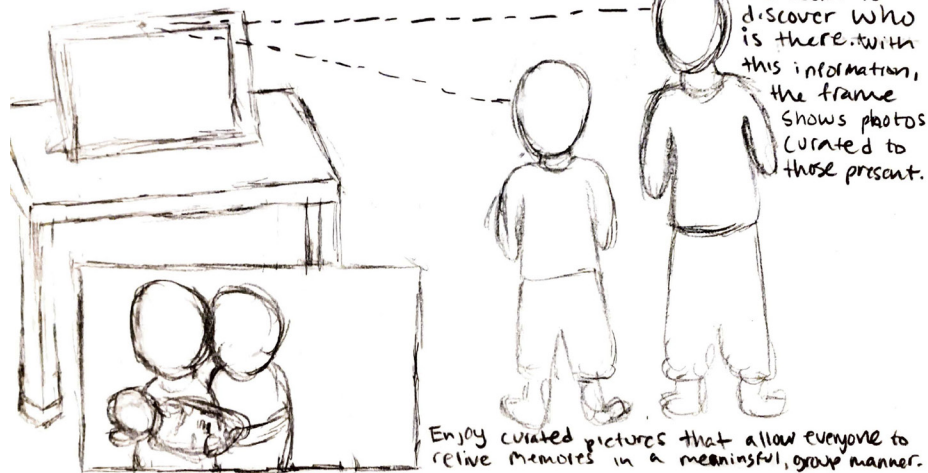
4. Wicking Flowerpot Field Study

Form

A wicking flowerpot uses a cotton rope to move water upwards from a reservoir within the pot to the plant above. The water reservoir must be refilled about once a week.

WICKING FLOWER POT self watering

Plant

Spout to pour water into

water (refill every week)
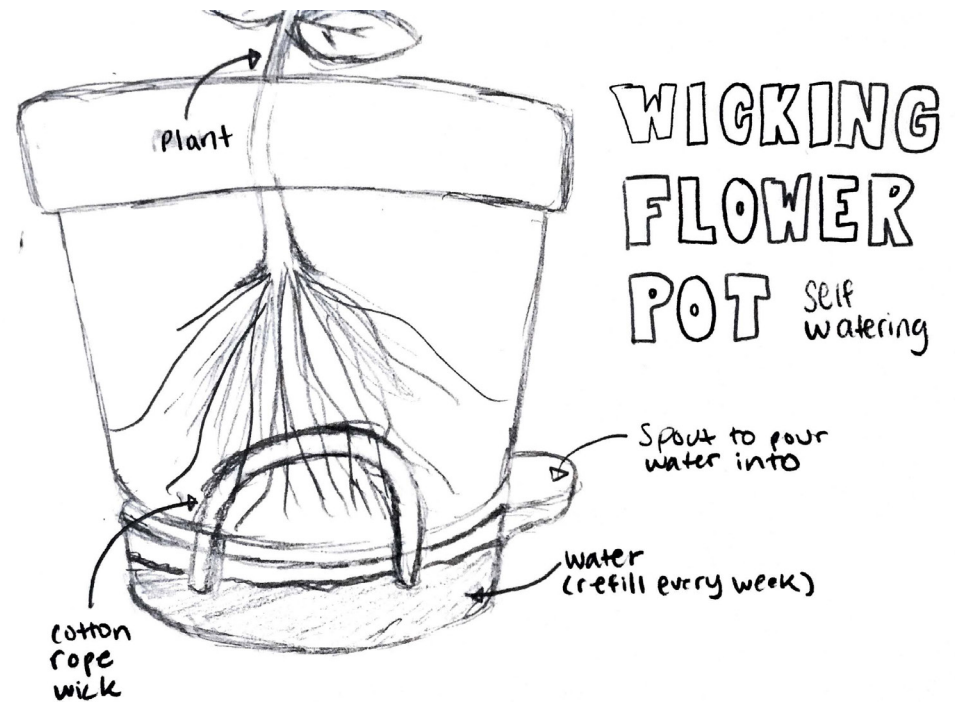
cotton rope wick

Features

When the cotton rope is covered in soil, the water that it collects will be able to travel upwards towards the plant.

When the pot is assembled correctly with the right amount of water, the system is self-sustaining for a week.

When the water reservoir is empty after a week, it must be refilled.

Artifact

The artifact is a flowerpot that waters plants sufficiently for a week.

Systems

Lifecycle of the Plant: the plant is housed by the flowerpot during its lifespan

Wicking Flowerpot: brings water upwards from the water reservoir to the plant using the cotton wick

Sun: provides the plant with the necessary light for it to produce glucose through photosynthesis

Refilling: the water reservoir must be refilled once a week to ensure the flowerpot is able to continue supporting the plant

Insights

Flowerpot monitors water, light, fertilizer, and temperature levels to determine if the plant's current condition is healthy

Natural language processing assistant exists within the wicking flowerpot

Interventions

Sensor monitors the water, light, and temperature levels of wicking flowerpot to determine how favorable the conditions are for the plant

> Allows the plant owner to understand how they can better care for their plant and ensure its survival

Wicking flowerpot becomes the device in which natural language processing assistant such as Amazon Alexa exists

> Allows flowerpot to serve a double purpose with an item it might often already be in the room with

> Natural language assistance system blends in more within the house, looks more natural and beautiful

> System can verbally remind owner to refill the water reservoir

> Flowerpot/natural language processing assistant takes on a more personified role through being voiced by the natural language processing assistant
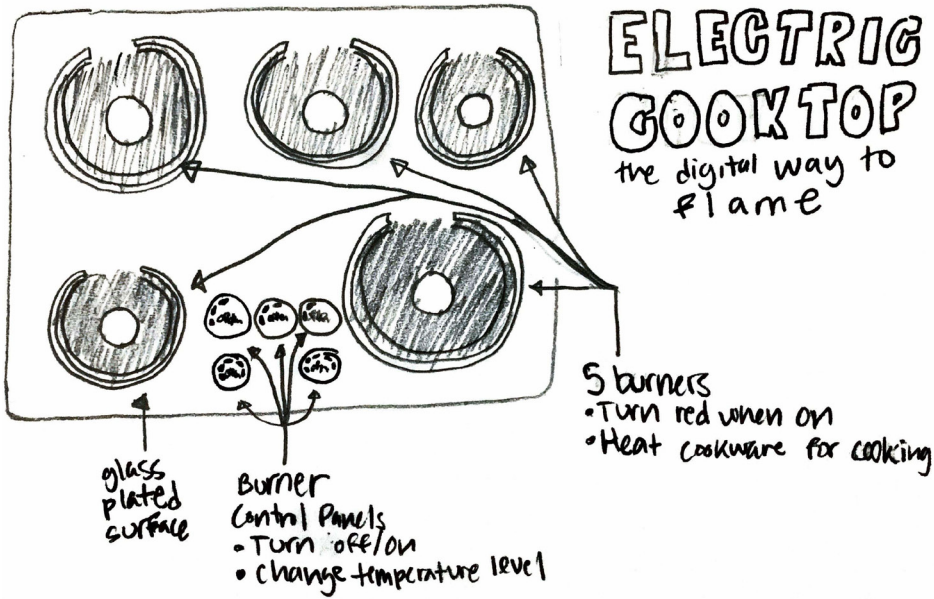
Invention

Volume Connection button

NATURAL LANGUAGE Processing Assitant Flowerpot

Hey Charles! Good morning! Would you like to start your day by refilling me with H₂O?

Waterproof speaker syster

DO all you love with your Amazon Alexa via your friendly houseplant!

Wicking technology for self watering
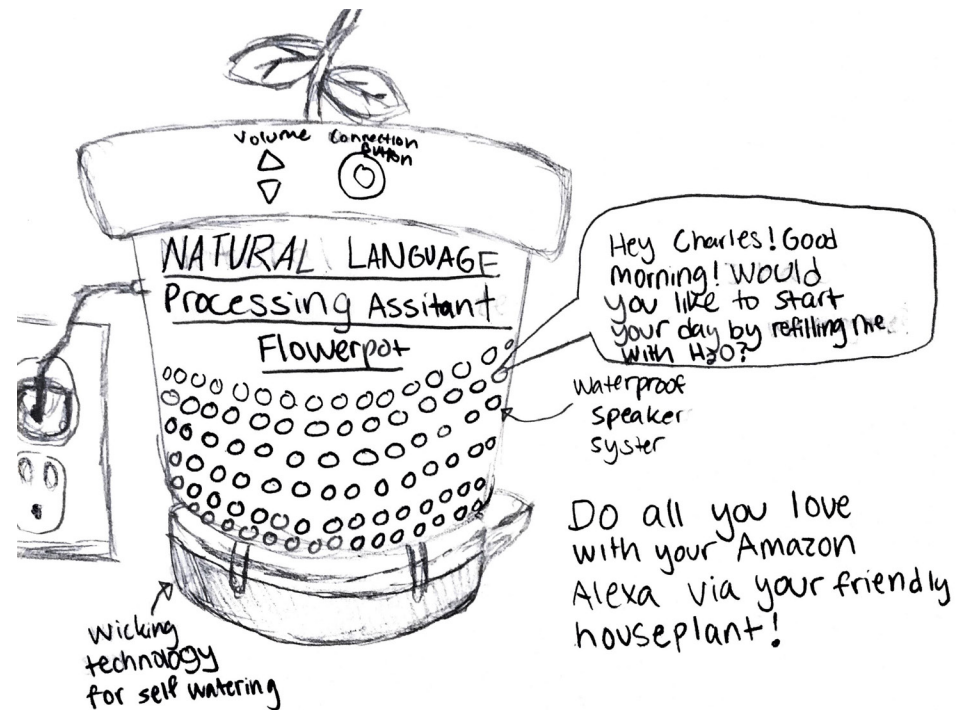
5. Electric Cooktop Field Study

Form

The electric cooktop allows for evenly dispersed cooking without a physical flame. The five burners on the stovetop heat up to the desired temperature level, selected via the control panel. Cookware can be placed on the ranges to heat them up for cooking purposes.

ELECTRIC COOKTOP
the digital way to flame

5 burners
• Turn red when on
• Heat cookware for cooking

glass plated surface

Burner Control Panels
• Turn off/on
• Change temperature level

Features

When a burner's on/off control is pressed for the first time, the corresponding burner toggles on.

When a burner's on/off control is pressed for the second time, the corresponding burner toggles off.

When a piece of cookware is placed on top of a burner that is turned on, the cookware is heated for food preparation.

When a burner's temperature is increased, the burner becomes hotter.

When a burner's temperature is decreased, the burner becomes less hot.

When the child lock button is pressed for the first time, no burners can be turned on.

When the child lock button is pressed for the second time, burners can be turned on.

Artifact

The electric cooktop is a kitchen appliance that is used for cooking.

Systems

Burners: each individual burner is able to be toggled off/on and raised/decreased for your unique cooking purposes

Heating Habits: humans eat on a schedule based on their job, family, or other outside system

Outside Electrical Powering System: powers the electric cooktop for operation

Insights

Child lock switch on the side of the stove that prevents cooktop burners from turning on when active.

Turn cooktop burners on/off or increase/decrease temperature level via a mobile application.

Send the cooktop/oven a recipe to have a mobile application guide you through the inputted recipe and automatically set your cooking appliances to the necessary settings based on your place in the recipe.

Interventions

Child lock button is moved to the side of the cooktop instead of being on the actual surface.

> Allows for easy cleaning. Before, wiping the cooktop down to clean it would mess with the buttons and cause random burners to turn on.

> Creates a safer cleaning process that prevents risk of burner turning on unintentionally during wipe down.

Electric cooktop settings can be controlled via a mobile application.

> Conveniently check if your cooktop is on from anywhere to minimize anxiety.

> Prepare the cooktop for when you plan to use it so that it is hot and ready at the moment you need it.

> Set the cooktop to turn on at a desired time so that it is automatically ready for you based on your schedule.

A mobile application uses a visual algorithm to create a convenient swipe-through recipe module from a written or digital recipe card. As you progress through the steps of the recipe module, the smart kitchen appliances set themselves to the appropriate settings based on what step of the recipe the user is currently working on.

> Helps user adjust the temperatures as needed based on the time allotted to each step in the recipe. For example, if a recipe says to first cook at a high temperature then change it to low after 5 minutes, the stovetop will automatically follow that schedule without the user having to take action.

> Autogenerated recipe modules help keep you focused on the task at hand instead of potentially overwhelming you by showing all the steps at one time.

> Modules help guide the user through the recipe on a timed schedule that will produce better cooking results.

Recipe
1.
2.
3.
4.

scan paper recipes

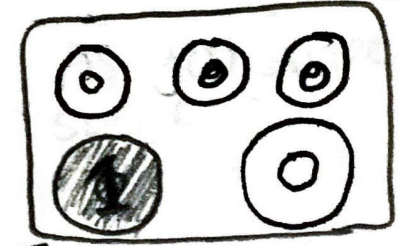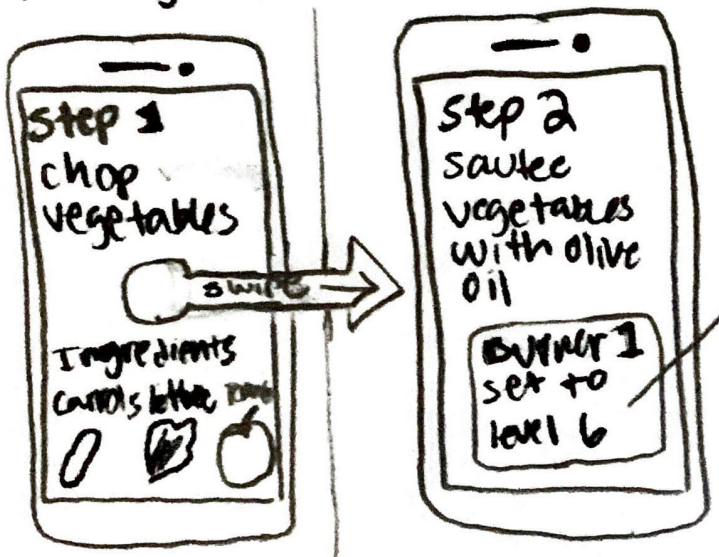Recipe
1.
2.

Send digital recipes

SOUS CHEF

the mobile application that guides you through recipes and automatically sets your smart appliances.

① Upload a recipe to sous chef. It will transform that recipe into a swipe-through recipe task module.

③ Enjoy cooking experiences that are timed and easy without stress!

step 1
chop vegetables

swipe

Ingredients
carrots lettuce tom

step 2
sautee vegetables with olive oil

Burner 1 set to level 6

② As you swipe to each progressive step in the recipe task module, your smart appliances set themselves in accordance with the current step.
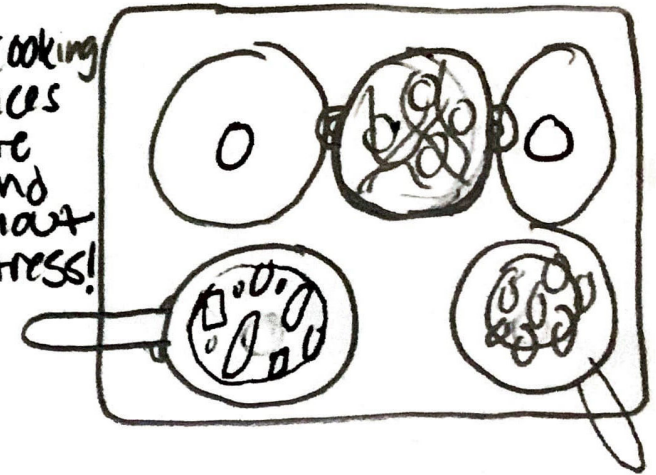
6. Bathroom Sink Field Study

Form
A bathroom sink is an appliance that assists in hand washing. The faucet releases water of a hot or cold temperature into a basin. The basin drains into the plumbing for the building in which it is placed. There is a lift up rod behind the faucet head that plugs the drain to prevent water drainage.
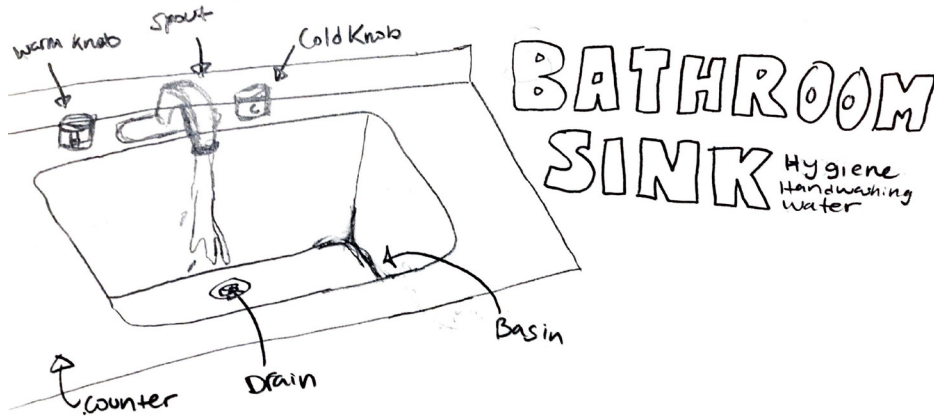
Features

When the hot or cold knob is turned right, water of the corresponding temperature is released through the faucet.

When the hot or cold knob is turned left to the off position, water of the corresponding temperature is released through the faucet.

When the lift up rod is raised, the stopper is lowered, preventing draining.

When the lift up rod is lowered, the stopper is raised, allowing draining.

Artifact

A bathroom sink is one of the main aspects of the bathroom space. It allows for handwashing and general access to water for hygiene.

Systems

Faucet: allows humans to control the temperature water that is released through the spout

Basin: catches the water that is released by the faucet and drains it into the pipes

Insights

The basin is able to self-clean when a dirty spot is detected.

The basin rim is a hand dryer.

A sink with toothbrush holders.

The sink becomes the hub for information about the surrounding area using natural language processing.

Interventions

The basin detects if there is a dirty spot of toothpaste or other substance and washes it with water.

> The sink now requires less maintenance for its owners to keep fresh and bacteria free.

The basin rim shoots out air to dry the hands when it senses hands coming going low enough in the sink.

> Could present health problems with people's hands gracing the sides of the sink.

> Would allow for the appliance to double as a hand dryer for convenience and ease of use.

A sink with toothbrush holders.

> The sink is able to take on the role of the toothbrush holder to prevent clutter within the bathroom.

> The toothbrush holder could fit seamlessly with the top of the sink for aesthetic purposes.
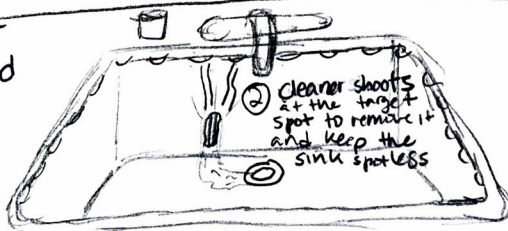
The sink becomes the hub for information at the start of your day

> While it might be strange at first to ask a sink a question, having a voice-controlled assistant inside your home bathroom would allow someone to start their day with guidance.

Invention
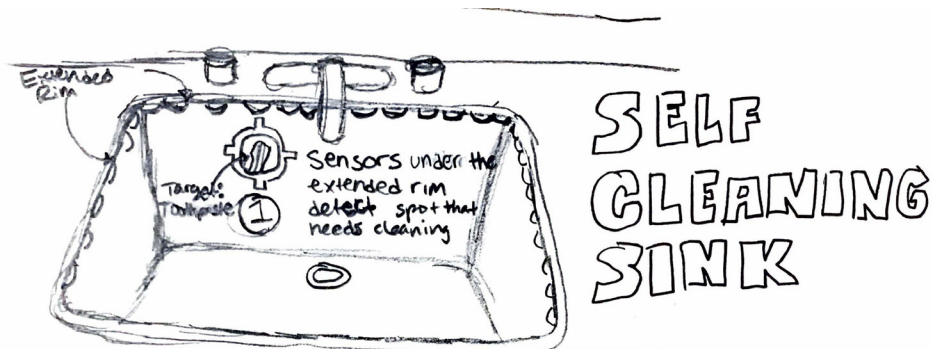
7. Mirror Field Study

Form

A mirror is a reflective flat pane of glass. Mirrors can be found in various locations throughout a home, such as the bathroom, bedroom, or hallway. They exist in many dimensions, both curved and uncurved. They are typically coated with metal amalgam, which is able to reflect a clear image.

Features

When an object or thing is in front of the mirror, it is reflected on the glass.

When light shines on the mirror, it is reflected off the pane.

Artifact

A mirror is a household object that is used to study reflections or as a decorative piece.

Systems

Mirror: an object that is positioned before the pane of glass is reflected on the surface

Home/Surrounding Structure: the location in which the mirror is positioned where objects within the structure fluctuate and are potentially reflected

Insights

A mirror that captures new images from its position and then reflects those images at the will of the owner to archive and display memories within that space of the structure

Mirror that tints itself to match the mood of the room for aesthetic purposes

A full-length mirror that allows users to save their outfits for inspiration when they are trying to decide what to wear in their wardrobe

Interventions

A camera will be placed within the mirror to capture pictures on demand at a scheduled daily time via the mirror when desired

> The mirror will save what it once reflected to a database of reflection pictures that the user can choose from to show memories in a natural, ambient manner

> Could show what memories have happened within the home or how the home has changed throughout time through studying the reflection database

> Could create functionality to show a reel of all captured photos to show a time-lapse of an extended period of time

Mirror studies the vocal and body language of the inhabitants within a room to understand the feelings of each individual. It then tints the mirror to reflect a color or moving pattern that matches the detected mood.

> Functions as a crowd sourced art piece to describe the feelings of those in the room

> Could help inhabitants better understand the emotions of others and themselves

A full-length mirror is able to capture a user's favorite outfits and enter each article of clothing in the photos to a database. The user can then use the full-length mirror to see their favorite outfits or mix and match clothing items when deciding what to wear.

> Would help a user remember their best options in their wardrobe and present those options visually to them to help them decide what to wear at a later day

> Would allow a user to see what a top they wore would look like with a different pair of pants through the mix and match functionality
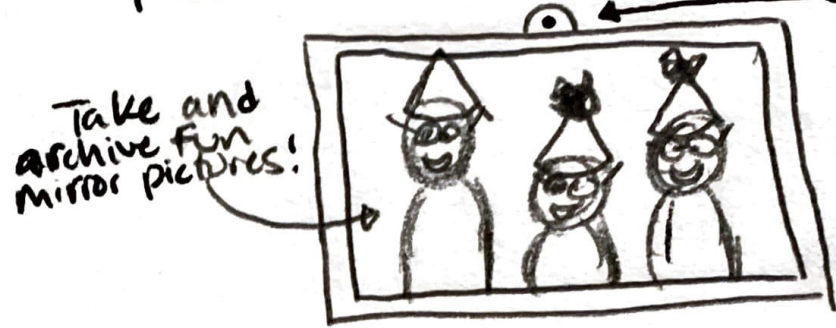
REFLECTION TIMELAPSE MIRROR

Introducing a mirror that archives the changes and memories within your home

① Set a time for the mirror to take an automatic picture from its position to record a daily reflection. Make sure the mirror is reflecting the scene of choice within your home when setting it up.

when should the mirror take daily photos?
Ⓐ 8:00am.

Mirror interface
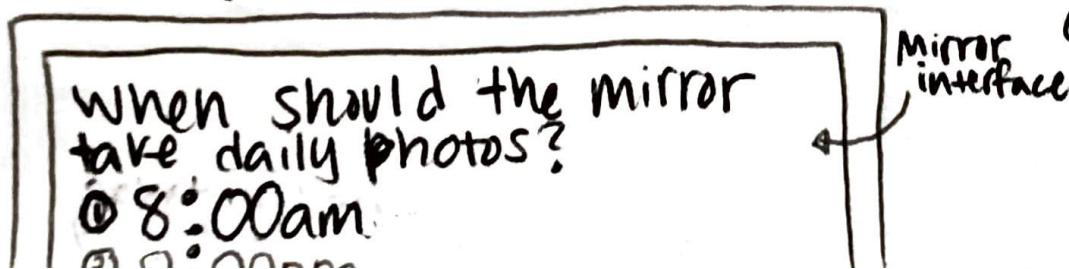
② When desired add your own special memories to the mirror's reflection picture archive. The mirror becomes the photobooth of the house!

camera

Take and archive fun mirror pictures!

③ Project your favorite memories on the mirror's glass. Or watch timelapse videos of the daily reflection archive to see rapid activity inside the home from an extended period of time.

Monday → Tuesday → Wed

Timelapse! Memories!
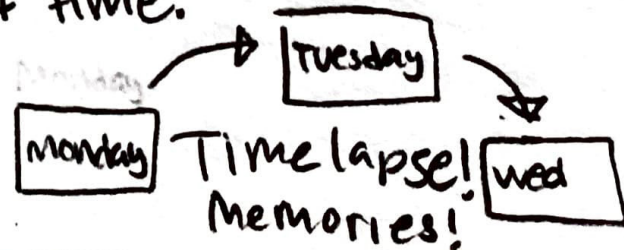
8. Controlled Access Highway Field Study

Form

A control access highway is public or private major road that is designed for high-speed traffic flows. Cars and trucks switch between the lanes on their journey along the highway and take an exit when they have driven the optimal distance for their destination. The leftmost lane is for switching lanes, while the rightmost lane is considered the slower driving lane. There are no traffic signals, intersections, or property access within the highway bounds.

Features

When a vehicle needs to pass another vehicle, it switches left.

When a vehicle is done driving in the left lane, it switches back to the right lane.

When a vehicle breaks traffic laws, they are pulled over.

When a vehicle has reached its optimal distance, it exits the highway.

Artifact

The controlled access highway is a type of road that allows for high-speed vehicular travel.

Systems

Vehicles: motor run transport object that allows for humans to get from point A to point B on the highway

Signage: physical signifiers along the highway that inform vehicles about rest stops, exits, mile markers, road issues, and other pertinent information for highway travel

Highway: allows the vehicles, directed by signage, to travel the highway

GPS: used to get on and off a highway at the optimal point for a vehicles journey to its destination

Weather: rain, snow, sleet, and other precipitation can limit the highway's usability in some circumstances

People: drive their vehicles on the highway

Insights

Roads are replaced with a solar panel roadway that is able to project image on its screen surface, readable by drivers

Vehicles enter on a highway, select their end destination, and then are automatically guided to the appropriate exit without having to drive

Interventions

Modular solar panel roadways are installed across highway systems

> Solar panel roadway modules create a screen canvas onto which road signs, lane lines, and other highway information can be placed digitally instead of with physical material

> Would reduce the need for highway maintenance

> Solar panels generate electricity

> Solar panels melt snow on contact

Vehicles are guided towards the exit optimal for their selected destination at the time of getting on the highway

People would not need to drive while on the highway which would prevent accidents and tunnel vision

Traffic problems can be optimized because drivers are no longer in control while on the highway, allowing the highway system to optimize vehicle flows

Would make the car more of a social space because drivers would be able to fully enjoy the company of their passengers while on the highway

Invention

① Vehicles select their destination on their carhead unit when entering the highway. If using a GPS, your destination is autofilled.

welcome to I-95!

Please enter your destination below:

Northeastern University
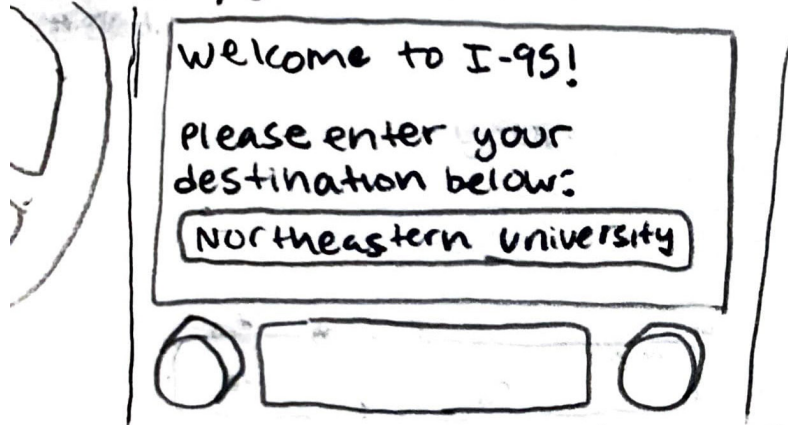
Vehicle Destination Guidance On Control Access Highway

② The vehicle is guided towards its selected destination without the driver needing to drive. Traffic flows are optimized by the highway system due to its control of the vehicles.
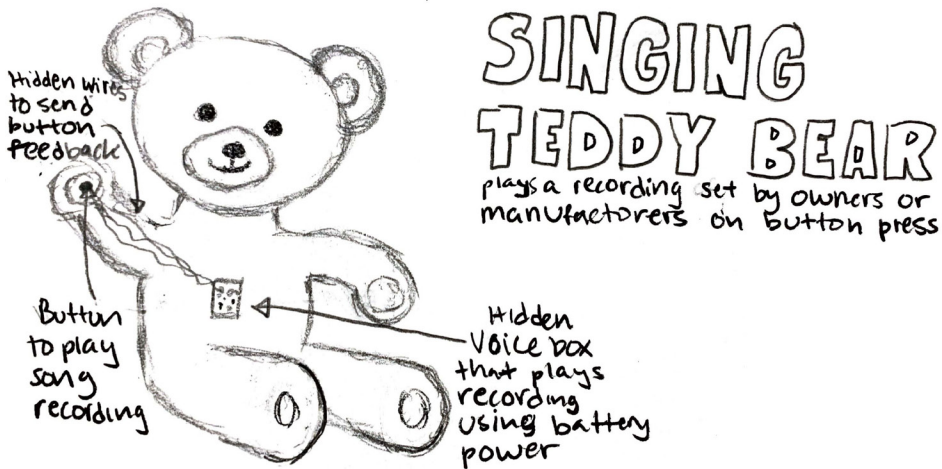
Car is guided towards destination while on highway

19753
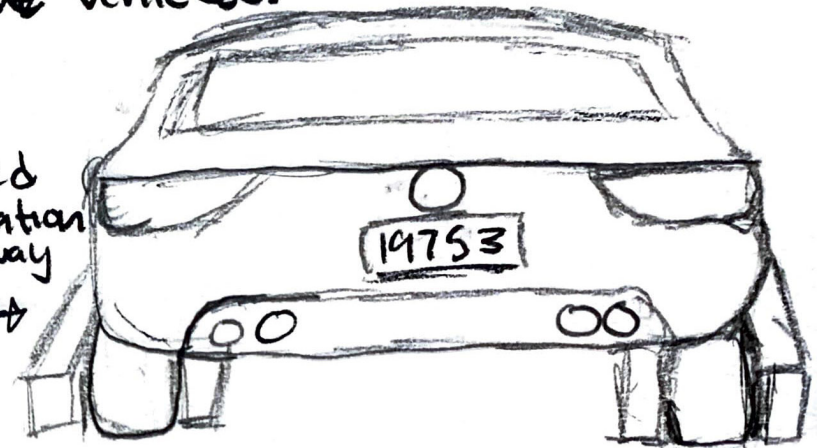
9. Singing Teddy Bear Field Study

Form

A singing teddy bear is a soft, friendly looking toy that children hug and play with for comfort and enjoyment. When the button is pressed on the toy, usually within the hand or feel, it sings a song selected by the manufacturer or future owner. After the song has finished playing through, the bear is again silent.

Hidden wires to send button feedback

Button to play song recording

Hidden voice box that plays recording using battery power

SINGING TEDDY BEAR
plays a recording set by owners or manufacturers on button press

Features

When the bear is held or seen, it provides positive comfort due to its appearance or sentimentality.

When the bear's button is pressed, it begins singing through a voice box.

When the batteries have died, the voice box no longer operates on the press of the button until the batteries are replaced.

Artifact

A teddy bear is toy that is often given to children as a gift for comfort and play.

Systems

Voice Box: plays the bear's voice recording on button press using battery power

Teddy Bear: stuffed animal that provides comfort with its appearance and sentimentality

Children/Adults: owners of the bear

Insights

Teddy bear is equipped with an AI system that is able to answer children's questions and provide verbal comfort when needed

Teddy bear is equipped with voice box that is voiced by a therapist, allowing them to provide teletherapy conveniently via a bear

Interventions

Teddy bear has a voice activated ai system designed for children that allows children to talk to it about their questions, concerns, fears, or other emotions

> If parents received a general summary of what their children said to the bear over the course of a week, it would allow them to better understand the emotions of their child

> Children would have a source of emotional guidance 24/7

> Singing teddy bears would be able to offer conversation, not just a song

If a microphone was placed into the teddy bear, a therapist could speak into a microphone that releases its feedback through the teddy bear's voice box

> Therapists would not need to be there in person to provide therapy for children, video recording from the bear would show the therapist their body language

> Children might feel more comfortable talking to a teddy bear rather than a new person (the therapist)

① Children are introduced to Talking Teddy by their caregiver. Teddy is their new friend they can tell anything to!

② Talking Teddy is the confidant that a child needs in their caregiver's absence. If the child has a question, fear, anxiety, or burst of happiness, Teddy is there to talk to.

③ Caregivers are notified when their child says something important via a mobile app. The child's behavior is analyzed by the app and presented to the caregiver weekly.

10. Attraction Line System at Volcano Bay in Orlando Studios Field Study

Form

Volcano Bay employs a line system in which guests scan their wristband at the entrance to the attraction they wish to enter. The wristband notifies the guest when they are free to enter the attraction so they may avoid waiting in line. The digital system is able to regulate the inflow of guests to the attraction through the data from wristband scans.
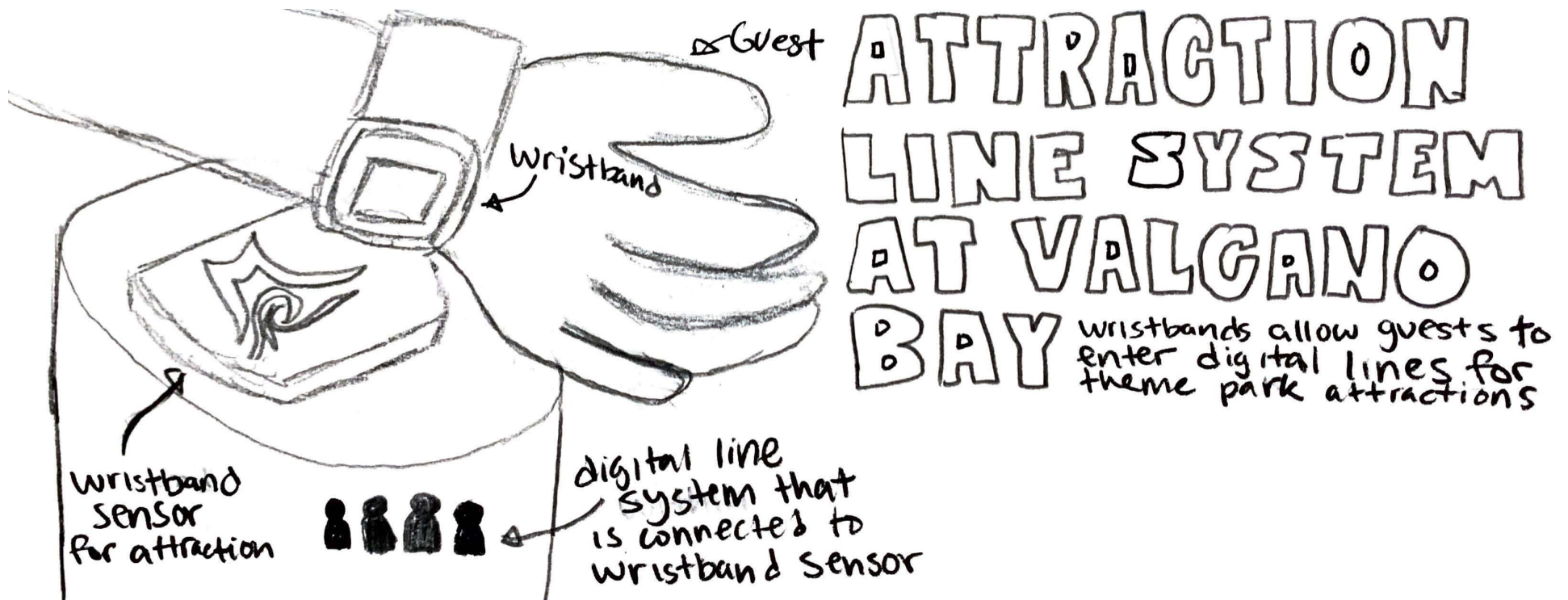
Features

When a guest scans their wristband, the system places them in a digital line

When a guest has reached the front of the digital line, they are informed via their wristbands that are free to enter.

If a guest chooses to step out of the digital line via their wristband, the digital line is updated to remove the guest that left the line.

Artifact

The line system at Volcano Bay is a strategy of guest management at theme parks.

Systems

Attractions: experiences that guests wait in the digital line for

Guests: people who come to the theme park to wait in digital lines for attractions

Theme Park: business which profits off guest attendance, needs to maintain the flow of guests onto the attractions in order to ensure guest satisfaction

Guest Wristbands: represents the identity of the guest, communicates with wristband reader to place the guest into the digital line

Digital Line System: maintains the flow of guests onto an attraction, collects guest wristband scans from wristband reader and enters the corresponding guest into the queue, sends notification to guests when they are free to enter the attraction due to their place in the queue

Insights

Wristband provides attraction suggestions based on your group's mood, aspirations for the day, and how much time you have to wait in the digital line

When you enter the theme park for the day, the system creates an agenda for your group for the day based on your aspirations for the day and the party you are visiting with

Interventions

After each attraction, guests enter on their wristbands how they're feeling, what types of attraction they want next, and how much time they want to wait. The wristband then shows each group the best next attraction options for them based on their collective choices.

> Allows guests to access attractions that would be best for their current situation

> Helps new guests better navigate the park

> Helps families manage their children's behavior

When guests enter the park, their wristband automatically creates an editable schedule for their group based on when they plan on leaving. Should guests find a new attraction they wish to ride, they can add it to their agenda and their schedule will accommodate the change.

> Helps groups maximize their time in the theme park and fit in their most desired attractions

> Removes the stress of wandering the theme park by providing structure

> Maximizes overall theme park operations to reduce wait times for attractions

① Guests recieve their wristband for the day when entering the park.

welcome!

THEME PARK ATTRACTION QUEUE OPTIMIZER

guests now have a schedule based on their needs to maximize their time at a theme park - all via their wristband!

② Guest groups answer a series of questions about their aspirations for the day.

What rides do you want to ride?
◯ Rollercoasters
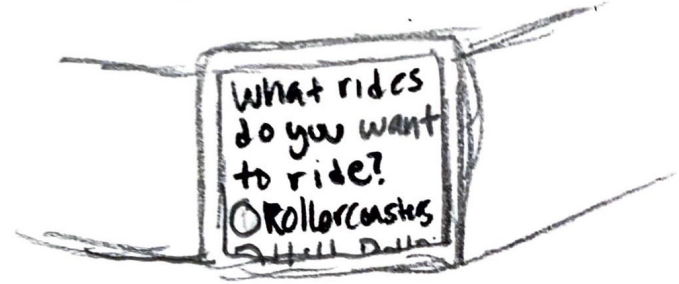
③ The wristband presents a schedule to the guest groups based on their selections.

Dec 9 Schedule
8am-Ride
8:30am-Show

*The system optimizes theme park operations to minimize wait times for guests

★ More rides, more structure, less waiting