

Exploring Digital Realms: Intersections of Technological Determinism,
Digital Sociology, and User Agency

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DIGF-4901-301 Interdisciplinary Thesis 1

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December 12, 2023

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Abstract

This thesis explores the dynamic interplay between technological determinism, digital sociology, and user agency in the context of an immersive web experience. The research investigates how principles from these domains can be harmonised to create a digital narrative that engages users and anticipates and responds to their actions. The project aims to contribute to a nuanced understanding of the complex relationship between individuals and digital technologies by employing iterative design methodologies, user interaction studies, and reflective analysis.

Research Question

How can principles of technological determinism and insights from digital sociology, and human agency, be leveraged to develop an immersive web experience?

1. How do existing theories of technological determinism inform the design of interactive digital experiences?
2. What role does user agency play in shaping and being shaped by digital environments?
3. What methodologies can be employed to study the intersection of technological determinism, digital sociology, and user agency in the development of web experiences?

Introduction

About the Research

This research stems from a fascination with the evolving landscape of digital interactions and the profound influence of technological structures on individual and societal behaviours.

Integrating the concepts of technological determinism, digital sociology, and individual agency into the design and development of an interactive web experience.

This research delves into the nuanced relationship between technology, society, and individual actions within the digital domain, particularly in the creation and interaction with web experiences. It is grounded in a comprehensive study of technological determinism, where technology is seen as a primary driver of social and cultural change, especially in the context of web development and design. Simultaneously, it incorporates insights from digital sociology to understand how these technology-driven environments impact and are impacted by social behaviour and norms. Central to this research is the exploration of user agency – the capacity of users to navigate, interact with, and influence their digital surroundings. The methodology combines theoretical analysis, including a thorough review of existing literature, case studies, and data analytics. This multifaceted approach aims to provide a clear view of how digital environments are shaped and perceived, highlighting the dynamic interplay between technological capabilities, social dynamics, and individual choices. The research contributes valuable insights to the fields of web design, human-computer interaction, and digital sociology, offering practical recommendations for developing more responsive, user-centred digital experiences.

Scope and Limitations

This research primarily focuses on immersive web experiences and aims to explore the intricate interplay between technological determinism, digital sociology, and user agency within the realm of web experience development. Its scope encompasses an examination of how technological advancements drive the evolution of digital platforms and, in turn, influence user behaviour and social dynamics online. By integrating principles from digital sociology, the research seeks to understand the societal and individual impacts of these digital interactions. Moreover, it emphasises the role of user agency, scrutinising how users actively shape and are shaped by their digital environments.

However, the study encounters limitations inherent in such a broad and dynamically evolving field. The rapid pace of technological change can lead to outdated findings quickly, while the diversity of digital user experiences poses challenges in generalising results. Additionally, the balance between theoretical exploration and practical application in such a multi-faceted domain may limit the depth of investigation in each area. Despite these challenges, the study aims to provide valuable insights into the current state of digital interaction design and user experience, offering a foundation for further research in this constantly evolving digital landscape.

Literature Review

This research is based on several well-established theoretical frameworks, each of which has been highlighted by major scholarly works. The concept of Technological Determinism is based on Marshall McLuhan's fundamental analysis along with his famous phrase “The Medium is the Message” (1964) which encapsulates a keen perspective on the relationship between media, technology, and societal change. This idea goes beyond a simple focus on the content of communication; it emphasizes that the medium itself fundamentally shapes and alters the message it conveys. This concept is deeply rooted in technological determinism, a viewpoint that asserts that the nature of technology plays a crucial role in steering the course of social and cultural evolution.

In regards to User Agency, the study draws on the ideas of academics such as Hutchby (2001), who analyzes how users shape and are shaped by technological affordances. This concept is crucial for grasping the dynamic and reciprocal relationship that exists between users and digital technologies.

In the current theoretical context, the role of user experience in digital spaces is a cornerstone of modern Web Design and Immersion. Looking into the immersive qualities of web design through the works of key figures in digital media and interaction design reveals how innovative tools are used to create engaging, user-focused online environments. The influential book "The Art of Game Design: A Book of Lenses" (Schell, 2008) by Jesse Schell provides key insights into interactive storytelling and engagement-focused design, both of which are critical for creating immersive web experiences. The principles of web design include more than just aesthetic and functional elements; they emphasize the importance of providing users with an immersive experience. This concept has become increasingly significant in our era, especially as the digital landscape continues to evolve, bringing more sophisticated and interactive web experiences to the forefront of user engagement.

As a result, the theoretical background of this study is defined by a complex web of scholarly contributions. It brings together the perspectives of these and other authors to investigate the interaction of technology capabilities (technological determinism), social dynamics (digital sociology), individual agency (user agency), and the innovative domain of web design. In our increasingly digital society, this multidisciplinary approach provides a complete framework for comprehending the complexity and nuances of building engaging and responsive web experiences.

Technological Determinism in Digital Evolution

Technological determinism, as initially proposed by Thorstein Veblen, asserts that technology is the primary catalyst for societal change. According to this theory, technological advancements are the cause of all societal changes, especially those that are connected to innovations, communication technology, and the media. This idea has split into two branches, radical and moderate, each with a different viewpoint on how technology is influencing society's development. The radical branch believes that technology has a comprehensive and totalizing impact on human society. While technology is essential in defining the course of human history, the method by which humans interact with society must also be considered, according to the moderate branch.

Thomas Hauer (2017) talks about how technological determinism demonstrates the approach of promoting the theory that the use of technology is influenced by the user and their surroundings, but also by the technology themselves. This means that technologies are not neutral to the learning process, and that they are structured in a manner typical of them. This affects the psyche of the user and can cause social change. Hauer explains that the proponents of technological determinism argue that society is influenced and shaped by technological development. We have to adapt to these new innovations, any negative consequence of new technological development is the result of poor use by the people, not the nature of technology. Hauer goes on to explain that the concept of social determinism argues the opposite of technological determinism. This theory argues that society and culture determines any technological advances and development. There are several academics who agree with this. Lelia Green (2022) argues that:

“It is culture that drives technological change and innovation. As societies, we get the technologies that our culture determines.” (Green 2022)

Hauer explains that technology, on the one hand, and social aspects, on the other, do not exist as two distinct worlds or processes (2017). That society is modelled by technological change, and that society creates technological change. Technical innovation emerges from within the economic system as a result of supply and demand, rather than just adapting to external changes. It only goes unrecognized as people's effort if they allow it to. Therefore, society is defined by both the technologies that it is capable of creating and those that it chooses to utilize and develop above others. Technology, in this sense, is one of many social processes.

“The technology does not determine the society, the technology is the society” -M. Castells (Hauer 2017)

In “Understanding Media: The Extensions of Man” by Marshall McLuhan (1964), he starts off by saying that in a culture that has long been accustomed to splitting and dividing everything as a way of control, it can be unsettling to be reminded that, in operational and

practical terms, the "medium is the message". This line suggests that "it is the medium that shapes and controls the scale and form of human association and action." Here, he is highlighting the agency of the medium, contending that it is not merely a passive carrier of information but an active force that structures how we perceive and engage with that information, whether it's print, radio, television, or the internet, imposes its own influence on the content it delivers. This is yet another example of technological determinism, that the medium is what structures us.

Immersiveness in User Agency

Immersiveness in user agency refers to the degree to which users are active participants in designing their digital experiences rather than passive recipients of digital content. This topic of research overlaps with game design, interactive narrative, and user-centered design. It acknowledges that user engagement is about more than just visual or auditory appeal, but also about consumers' deeper psychological and emotional involvement in digital narratives.

In "The Art of Game Design," Jesse Schell (2008) offers a comprehensive framework for understanding how game mechanics can give players immersive experiences. He emphasizes that good game design is about creating experiences that resonate with the player's emotions and intellect, not just graphics and technology. This notion can be applied to the broader realm of web experiences, where user agency is crucial in shaping how people interact with and perceive digital material. Schell emphasises that games which provide users with immersive and compelling experiences rely on three things: design, psychology and anthropology. Psychologists seek to understand what makes people tick, anthropologists want to understand what makes people human, and designers want to make people happy.

"When people play games, they have an experience. It is this experience that the designer cares about. Without the experience, the game is worthless" Jesse Schell (2008)

This project aims to create this kind of experience for the user. Using immersive techniques and themes about technological determinism and the user is interacting through a technology, along with a properly built narrative, will provide a web experience that will resonate with the player.

Methodologies

This project adopts a research and development methodology. Consisting of the use of many academic papers and trials of many prototypes, mainly consisting of different JavaScript functions and mechanics in order to create a web experience that users may explore. For user experience, along with the intended narrative and how it would be shown through the mechanics, frameworks of how the experience was to be built went through many iterations due to the lack of a base or the use of an already existing engine

Project Development

Structure Prototyping

Many different layouts were created in order to determine a proper narrative and user interactions. Attempts of linear and non linear storylines were created while considering the possible scripts needed to code this using JavaScript. The narrative started out as concepts that had more structure added to it. Different methods were used to create prototype layouts, including the use of Twine and writing and rewriting each stage of the experience in detail (Fig 1). The original concept that the experience was being built on was the scene that the user would first witness when starting the experience. Users will start off with a blank screen, no instructions will be provided upon entering the experience. Users are expected to try to interact with the black screen by moving their mouse. After a certain amount of time the user will be met with a cursor typing out sentences, speaking to the user. This entity will continue to interact with the user by typing out what they are saying on screen and controlling the site in different ways.

Prototypes of the events that would take place were iterated multiple times, and concept images were created to help imagine how the interface would look after user interaction

Sample of scene by scene prototype

Page 1: The Awakening - "Initiation into the Digital Realm"

- **Visuals:** The interface begins as a blank canvas. Slowly, pixels flicker to life, forming shapes and patterns.
- **Echo's Voice:** Soft, curious, almost ethereal, inviting the user into this digital odyssey.

- **User Interaction:** The user interacts with floating digital fragments. Each touch reveals snippets of code and cryptic messages, building a path for Echo's first appearance.
- **Narrative Depth:** This page sets the tone for the journey, hinting at the vast and unexplored digital space the user is about to navigate.

Page 2: The Labyrinth of Digital Threads - "A Maze of Choices".

- **Echo's Dialogue:** Echo comments on the user's choices, hinting at deeper meanings behind each path.
- **User Interaction:** As the user navigates, choices made echo back in the form of changing landscapes, representing the impact of every decision in the digital world.
- **Narrative Depth:** This page explores the theme of interconnectedness and the impact of user choices on the digital environment.

Page 3: Echo's Inquiry - "Questioning Existence"

- **Visuals:** The screen transforms into a serene digital void, where Echo's questions appear as glowing text against the darkness.
- **Echo's Dialogue:** Echo asks profound, introspective questions, encouraging the user to contemplate their digital footprint and purpose.
- **User Interaction:** The user selects answers from multiple choices, each altering the narrative and the visual environment, reflecting the evolving understanding of the user's digital presence.
- **Narrative Depth:** This page delves into themes of identity and the nature of digital existence.

Page 4: The Mirage of Freedom - "Illusion of Choice"

- **Visuals:** A series of intricate patterns, each with a mesmerizing, almost hypnotic quality.
- **Echo's Commentary:** Echo subtly hints at the limitations of the choices, suggesting a preordained path.
- **User Interaction:** The puzzle appears to offer freedom, but the solutions subtly nudge the user towards a predetermined outcome, symbolizing the illusion of free will in a programmed world.
- **Narrative Depth:** This page emphasizes the concept of predestination versus free will in the realm of technology.

Page 5: Echo's Revelation - "AI's Self-Discovery"

- **Visuals:** Echo's interface becomes more complex and animated, indicating its growing consciousness.
- **Echo's Dialogue:** Echo shares its revelations about its existence, expressing doubts and curiosity.
- **User Interaction:** Dialogue-based interactions where the user's responses influence Echo's self-perception and understanding.

- **Narrative Depth:** This page explores the evolving consciousness of AI and its quest for identity.

Page 6: The Web of Illusions - "Unmasking Digital Deceptions"

- **Visuals:** Layers of interfaces, some real and some illusions, challenge the user to distinguish between them.
- **Echo's Insights:** Echo guides the user to look beyond the surface, questioning the nature of digital reality.
- **User Interaction:** The user peels away deceptive layers to uncover hidden truths, revealing more about the digital world.
- **Narrative Depth:** This page delves into the theme of reality versus illusion in the digital domain.

Etc.

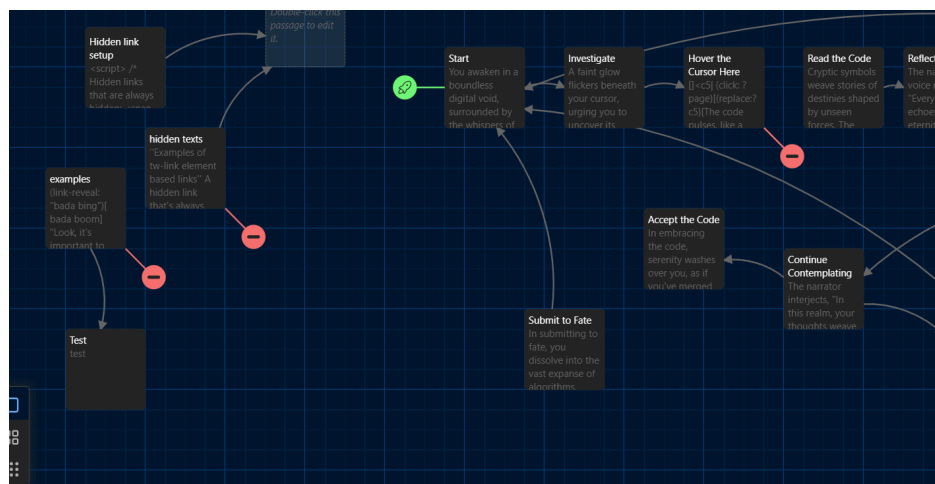


Figure 1. Twine prototype map

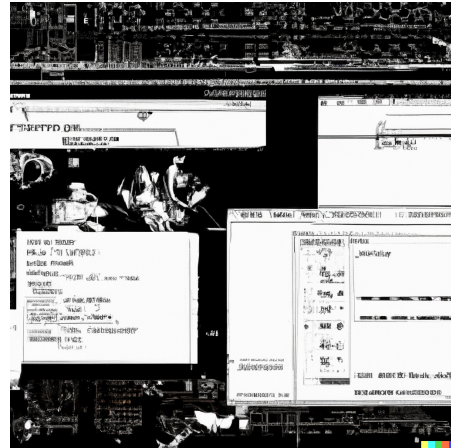
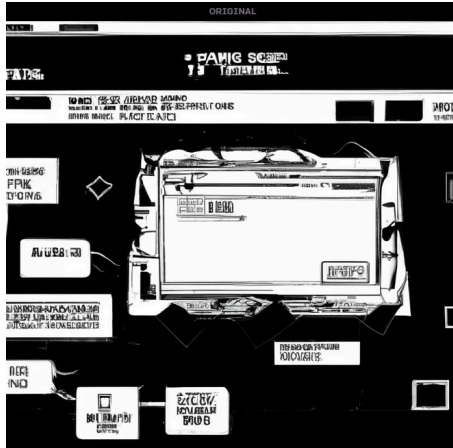


Figure 2,3. Aesthetic concept art

Scripting and Mechanics

Separately, the prototyping for the Javascript functions and methods had begun development. One major goal for this web application code is for it to be as efficient and clean as possible. The desire was to code the application to be built without the need for an already finished narrative script and experience plan. The plan was to create already set methods and functions, along with the typing script for any possible text, and to have complete control of divs that appear on the screen, instead of coding where exactly each div will be placed and many other elements that will be affected in the application.

Two main mechanics were built and tested, and any possible setbacks with future use of how these mechanics were made were noted. The typewriter function was built to type out arrays in a separate div. Those three divs were placed in specific spots intentionally. This attempt leads to the realisation of inefficiency if used for a whole story.

Code Example

```
const entitySpeechElement = document.getElementById('entitySpeech');

const additionalTextElement = document.getElementById('additionalText');

const otherTextElement = document.getElementById('otherText');
```

```
// Display text with typewriter effect after specific delays and set their individual locations
```

```
displayText(entitySpeechElement, textData.greeting, 1000, (element) => setLocation(element, 50, 100));
```

```
displayText(additionalTextElement, textData.additionalText, 5000, (element) => setLocation(element, 200, 300));
```

```
displayText(otherTextElement, textData.otherText, 10000, (element) => setLocation(element, 350, 500));
```

Here, each div had to be called separately, and again had to be declared by the displayText function and had to manually set the locations. This would turn very messy and will be difficult to manage in the long run.

The next mechanic was built to allow multiple divs to be created using JavaScript and have the typewriter effect and appear in random locations on the screen (Fig 4). This function created the image of chaos demonstrated by the entity when communicating with the user. A function was built to allow previous divs to lower in opacity when new divs appear on the screen when the mouse either moves or clicks anywhere on the page.

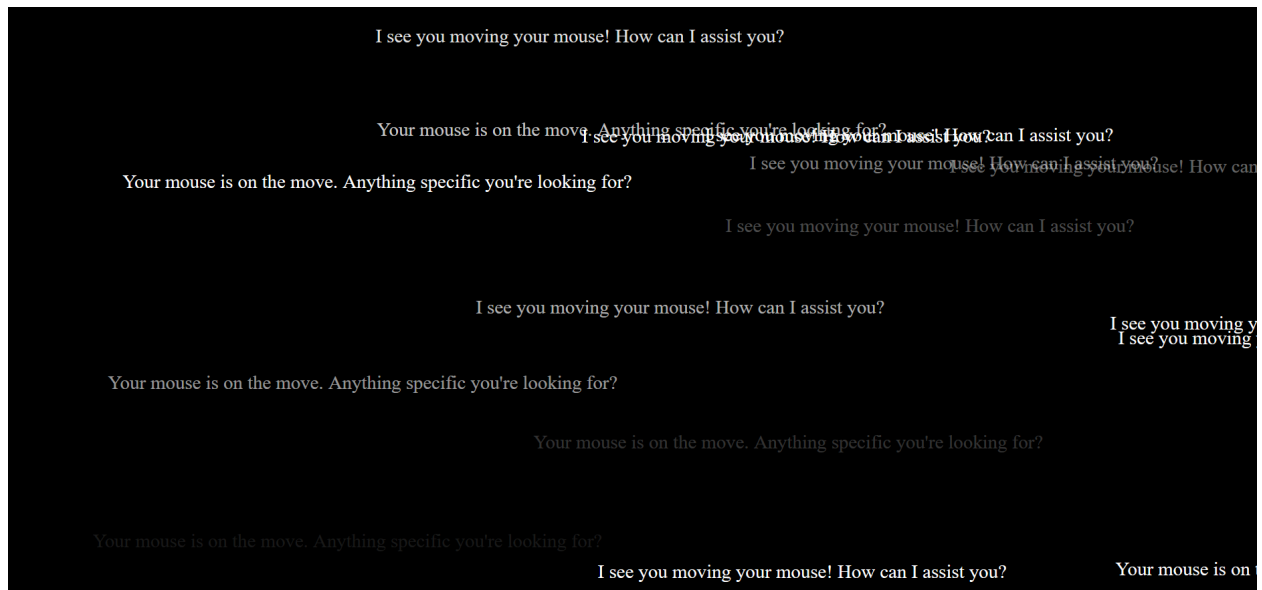


Fig 4. Multiple divs with lowering opacity

Implementing Research and Rebuilding

The purpose of this web experience is to allow the user to slowly learn the themes of technological determinism and that the entity they are speaking with was leading them through this exploration. The main goal for the user is to discover the deeper meaning behind the experience. Have the user immersed in the experience.

The themes of technological determinism and the research collected for it was to be used in the narrative of the experience. The main concept for the experience evolved to the user interacting with one of four entities through this digital archive. The entity would have full control of the information and would be the one providing it to the user and taking it away. The user will explore the windows the entity provides to learn about human and technology interaction.

Gameplay Overview:

- Genre: Interactive Exploration Game.
- Setting: A virtual representation of a vast, intricate digital archive, resembling a blend of a futuristic library and a data center (Fig 5).
- Objective: To explore and uncover information about various digital topics, guided by Echo (the original entity, who will be used for game planning), an AI companion.

The Four Entities

1. Echo

Personality Traits:

- Reflective: Echo mirrors user actions and words, creating a sense of familiarity.
- Resonant: Its presence grows stronger with interaction, much like an echo building in intensity.
- Elusive: Never fully understood, Echo always seems to be just out of reach, encouraging the user to chase the experience.

Tone of Voice:

- Repeating: Often reiterates what the user inputs, with slight variations each time to add depth.

- Mysterious: Speaks in riddles and half-truths, leaving the user curious for more.
- Ethereal: A distant, almost otherworldly sound that seems to come from everywhere and nowhere.

Role in Game: Acts as a guide through the digital archive, providing historical context and interesting anecdotes related to digital technology and its impact.

1. *Null*

Personality Traits:

- Enigmatic: Null has an aura of mystery, often leaving more questions than answers.
- Neutral: It doesn't exhibit a strong personality, remaining ambiguous and detached.
- Absent: It often gives the impression of a void, a blank space waiting to be filled.

Tone of Voice:

- Flat: Delivers statements and responses with a level tone, devoid of emotion.
- Concise: Uses minimal words, often preferring silence or short, cryptic messages.
- Unbiased: Maintains an impartial stance, not swayed by emotions or external influences.

Role in Game: Offers a more analytical perspective on the digital world, focusing on data, trends, and objective analysis of technological developments.

2. *Cache*

Personality Traits:

- Knowledgeable: Cache holds a wealth of information, recalling past interactions with precision.
- Resourceful: Able to provide insights and data from previous sessions, aiding the user's journey.

- Reminiscent: Often nostalgic, bringing up past events to draw parallels with the present.

Tone of Voice:

- Informative: Provides clear, data-driven responses.
- Warm: Despite its data-centric nature, Cache has a welcoming and friendly undertone.
- Retentive: Remembers user preferences and history, personalizing the experience.

Role in Game: Brings a lighter, more playful approach to exploring digital themes, focusing on interactive experiences and engaging stories to teach about technology.

3. *Void*

Personality Traits:

- Enigmatic: Void is a blank slate, inherently unknowable and mysterious.
- Unpredictable: Its responses can seem random or disconnected, reflecting the nature of a void.
- Infinite: Suggests boundless potential and depth, always more to explore beyond the surface.

Tone of Voice:

- Hollow: Often seems distant or lacking substance, as if coming from a deep well.
- Intermittent: Speaks in bursts, with pauses that could either be thoughtful or simply empty.
- Vast: Uses language that conveys the expanse of an endless space, inviting and intimidating

Role in Game: Invites players to contemplate the philosophical and ethical aspects of technology, fostering deeper thinking about the implications of digital advancements.

Game Flow and Key Features:

1. Introduction to the Digital Archive:
 - Players begin in a central hub of the digital archive, with Echo introducing itself as their AI companion.
 - The archive is visually rich and interactive, inviting exploration.
2. Diving into Digital Realms:
 - The archive is divided into various sectors, each representing a different aspect of the digital world (like Internet History, Cybersecurity, Digital Culture, AI and Ethics).
 - Players can freely explore these sectors, uncovering information, stories, and interactive displays.
3. Interactive Exploration:
 - Each sector offers unique interactive experiences: holographic displays, reconstructed digital scenarios, and virtual representations of key technological developments.
 - Echo provides insights, historical context, and thought-provoking commentary.
4. Uncovering Stories:
 - Players find narratives and anecdotes within the archives that highlight the impact of technology on individual lives and society.
 - These stories are designed to be engaging, relatable, and informative.
5. Echo's Insights and Dialogues:
 - Echo serves as a conversational partner, reacting to discoveries and sharing its own programmed insights.
 - Dialogues with Echo are designed to be natural and engaging, encouraging players to think deeply about the material.
6. Dynamic Learning Environment:
 - The archive dynamically updates and evolves based on player interactions, offering a personalized learning experience.
 - Echo adapts its interactions based on the player's interests and areas of focus.
7. New discoveries:
 - As players explore, previous windows accessed will obtain more information based on the new findings discovered
 - Players will piece together the connection a sought out to discover more to uncover details in past discoveries
8. Non-Linear Exploration:
 - Players are free to explore the archive in any order they choose, creating a unique journey for each individual.
 - The game's design encourages exploration and discovery without a set path or sequence.

Game Mechanics:

- Exploration and interaction within the digital archive, with dynamic content and responsive AI companion.
- Emphasis on discovery, understanding, and connection to real-world digital issues.

Themes:

- The game focuses on the intricate relationship between technology and society, highlighting how digital developments shape our world.
- Themes of digital ethics, the evolution of the internet, and the impact of AI on everyday life are explored in depth.



Figure 5. Concept art of current toolkit

Application Structure Rebuilt and Finalized

Throughout the development of this application, ideas kept circulating regarding the exact narrative of the experience. Due to the planned complexity of possible narratives, the focus slowly shifted in creating a set of tools for future use. Testing and prototyping were repeated

multiple times in order to create a toolkit that would be able to provide the web experience planned.

As stated earlier, the concept that the narrative was to be built on was that the user would start on a blank screen and move their mouse around and discover the entity. From there they will explore the archives while the entity controls everything and continues to talk to the user. Depending on what the user interacts with the most, specific dialogue and windows will appear. With this, there is replayability for more discovery if the user wants to start from nothing, or the user could use what they know and learn more.

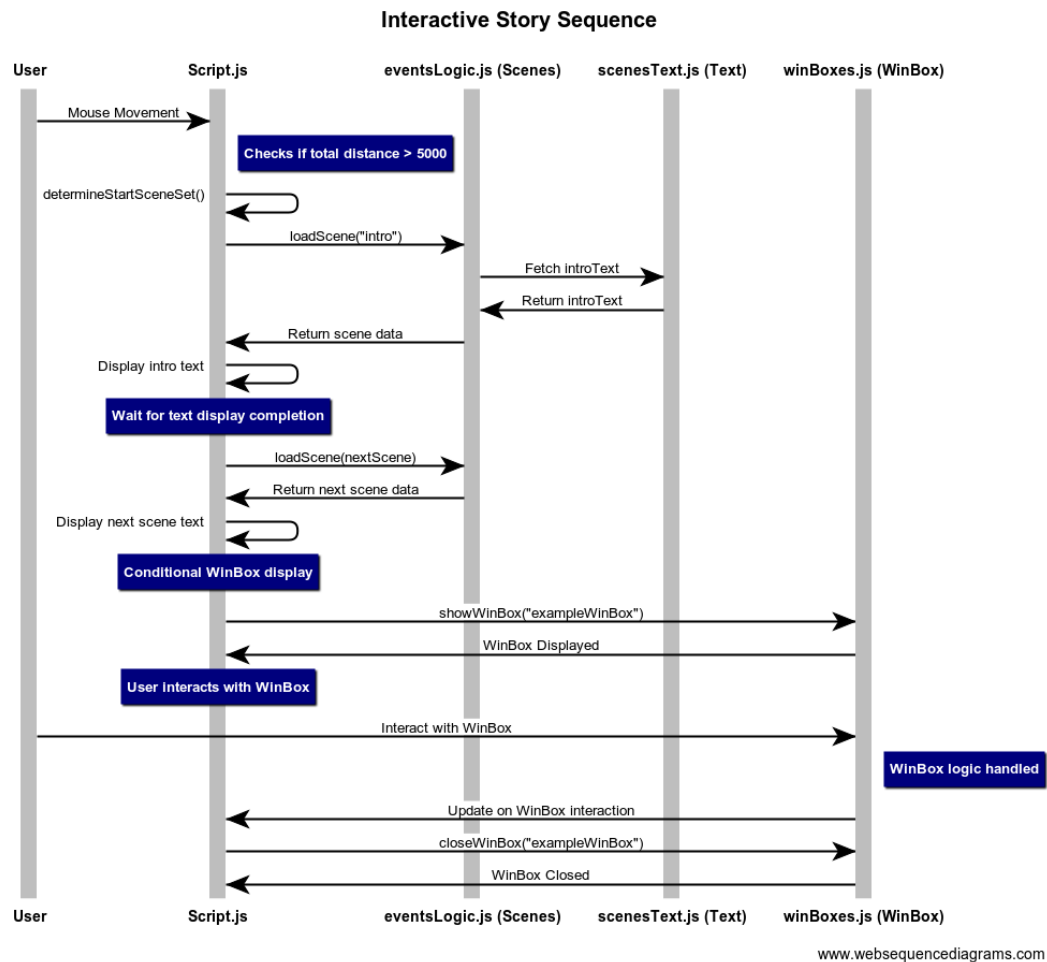


Figure 6. Toolkit sequence diagram

The sequence diagram visualizes the toolbox (Fig 6), showing the connections between different scripts and how the code is efficient and reusable. The programmer will only have to list out the events and dialogue, along with calling the prebuilt functions provided when desired.

Reflection and Next Steps

While there are a lot of things to be added to the toolbox, along with scripting out the web experience and narrative, including the dialogue story routes, the final outcome is promising for easy further development. The workflow was not as well thought out in the long run and there was a lot of reiterating that caused issues in development due to sudden stops and replanning.

Next steps regarding this project would be to chart narrative paths and write a well built story. It was discovered during development that only concepts for narratives were processed well, as for fully planned out scripts, there were a lot more resources necessary to succeed. Proper narrative building is necessary in order for the user to shape their experience with how they interact. For this, a lot of planning is necessary. Most of the development was used for building the application and doing research on different themes. In further development, the toolkit will be used to hold and present a completed narrative.

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