

Improving Access To Critical Games For Game Education At Cultural Heritage Institutions

Introduction: The Game Research Group (GAMER Group) at the University of Washington Information School (UW iSchool) – with the [Video Game History Foundation](#) (VGHF: a non-profit organization dedicated to preserving, celebrating, and teaching the history of video games) and [The Strong National Museum of Play](#) as the partner organizations – requests \$249,628 for a two-year research project to document current accessibility methods of critical games for game education within the digital games space at cultural heritage institutions and the access needs of game experts. This project has two goals:

- To identify games that domain experts consider as critical to game history and education, analyzing what shared characteristics these games have and why the stakeholders find these characteristics important, as well as investigating how accessible they are.
- To develop a clear understanding of what accessibility issues exist regarding games, game hardware, and game-related artifacts within cultural heritage institutions and current strategies for navigating these accessibility issues.

These goals will help us establish best practices for providing access to games and game-related artifacts to a wider audience through museum and library collections, in alignment with **objective 3.3 of the IMLS National Leadership grant** as an applied research project. The project deliverables will include 1) a list of critical games along with the availability and accessibility of relevant game versions, game hardware, and development artifacts for each game, 2) best practices document for navigating accessibility issues related to games and game development artifacts in cultural heritage institutions, and 3) white paper and academic publications on existing barriers related to game and game artifact accessibility, strategies and mediation plans for identified issues. Our research will help empower librarians, archivists, and museum professionals to better meet the game access needs of researchers and educators and promote use of existing facilities and collections. Beyond game preservation, our research outcomes will also contribute to shaping future access and preservation strategies for complex digital artifacts in general.

I. Project Justification: Ensuring Access to Critical Games in American Media History

Video games have evolved into an important part of our modern cultural heritage. Since the patenting of the cathode-ray tube amusement device by Thomas T. Goldsmith Jr. in 1947 (Goldsmith, 1948), the legacy of video games has been deeply rooted in U.S. culture and modern history. The U.S. was the pioneer of advancements with game technologies; from the creation of the first recreational game (“Tennis for Two”, 2024), the first arcade cabinet (“Computer Space”, 2024), and the innovation of interchangeable media to expand game availability on home systems (“Magnavox Odyssey”, 2024). By the late 1980s, video games have gained increased relevance within popular culture, technology familiarity, and cultural identity. Today, 85% of Americans between 16-64 play games regularly (Stastia, 2024). This rivals viewers of television and streaming services, showing just how entwined American culture has become with video games. However, we are in danger of losing access to many of these cultural artifacts which means we would be losing the evidence and records of the significant innovation and ingenuity that America embodies in modern art history.

Need 1: Demand for game-related education programs is on the rise. In 2014, it was identified that the number of schools that offered degrees or certificates in game-related subjects increased from 254 (2009) to 390 (2014), over 50%, in the 5 year period (Valentine, 2014). Subsequently, there is a growing need for access to classic games that serve as the pioneers and quintessential examples of game mechanics implementation, the evolving market, the various eras of game development and education, experimentation, and more.

Additionally, the game industry has seen the number of games released annually skyrocket by 13,098% over the last 40 years. The [Nintendo Entertainment System](#) (2024), one of the most popular early game consoles, had a total of 837 games released in the U.S. of its 10 year relevant lifespan (1985-1995, avg. 83.7), compared to the

10,963 games released on Steam, the leading digital game storefront, alone in 2022 (Statista, 2023). This paired with the advent of digital only available titles and a transition to digital over physical distribution means that games are increasingly likely to be overlooked due to the sheer volume of titles introduced to players every year, and an inability for anyone to play them all. A list of significantly important games in game research, education, and development based on their impact, not just commercial success (Smithsonian, 2012), will be helpful for domain experts navigating the ever increasing number of games.

Need 2: Complex access constraints hinder game accessibility at cultural heritage institutions. While efforts are being made to preserve games at cultural heritage institutions, due to the Digital Millennium Copyright Act (DMCA), libraries can only provide digital access within the physical location itself. This means patrons are only able to access physical copies, or at best digital archives at the institution's physical location. While emulation has resolved some issues regarding the access of digital games, these efforts are heavily reliant on hobbyist innovation, resulting in many platforms/systems not having accurate emulation support (Salvador, 2024). While the digital game itself is usable under fair use through DMCA, a “digital lock” has to be broken to gain access to the game in a purely digital format, which is a violation of DMCA (Imfeld, 2003; Brandon, 2023). As a result, original hardware is the only way to experience some libraries of artifacts due to a lack of hobbyist interest or unique hardware conditions complicating hobbyist efforts. The issue regarding original hardware is magnified due to the degradation of physical components of not only the games themselves, but also the proprietary systems and accessories that are required to experience them. This compounds issues with game design education, where instructors find themselves unable to provide access to games that would best communicate key elements or aspects related to the games design or course materials for their students (Zeilinger & Jayemanne, 2021; Schneider, 2023; Suess, 2023). As a result, curriculums are often explicitly designed around the games that educators know are in distribution, regardless of if they are the best example of a theme, mechanic, or relevant concept. This was revealed through our preliminary interviews with game design educators and historians regarding their knowledge of DMCA and games they wanted to incorporate into their work and their accessibility, conducted as part of research for the history game availability study in partnership with the VGHF. The revelation that 87% of classic games are unavailable (Lewin, 2023) is a concerning statistic for a medium that is barely half a century old. In addition, many existing cultural heritage institutions are overly focused on preserving commercially available games that are popular with the general public, and there is little communication as for what exists in various archives, further complicating access.

While many libraries have begun carrying games, the complex nature of expertise within this space due to the booming growth of the industry causes significant gaps in knowledge regarding access needs, dependencies, and artifact maintenance for library staff. Even if one is able to find a copy of an early computer game from an archive, there is no guarantee that it can be played on one of their machines, which renders the preservation of the artifact largely moot (Salvador, 2024). This is an understandable but unfortunate phenomenon due to the rapid advancements of hardware and software, and serves as a sign that more care and attention need to be provided in the preservation of these artifacts to maintain their availability to the public. How can we expect to further video games as a creative and expressive medium if we are unable to provide access to historic examples of excellence, regardless of their initial commercial success? As with all forms of art, forays into new methods are rarely met with immediate adoption but become pillars of approach and form as others iterate off of these early ideas and concepts (Geist, 1983). Identifying what types of collections are held at different institutions will empower users to access the medium, which can inspire future creations of games.

Need 3: Commercial digital availability is unreliable. There has been a significant shift in digital-only media ownership in the game industry. When it comes to games that were released after 2008 (7th console generation) digital availability became standard, and since then we have seen the closure of digital storefronts, fully removing access to games that were previously widely available. Additionally, digital games can be delisted due to licensing issues at any time after the game's release. Consider *Spec-Ops: The Line* (2024) as an

example. Spec-Ops: The Line was initially met with below target sales, but received critical acclaim for its approach to narrative design and incorporation of player agency into narrative decisions. It became a highly respected game and developed a cult following, resulting in roughly 3.7 million sales through Steam before it was delisted. Now this game, which is revered as a prominent milestone in video game history, is only available to those who already purchased it or are willing to get a physical copy for outdated systems (Playstation 3, and Xbox 360). This effectively removes the game from future audiences and heavily reduces the potential for widespread impact in a similar vein to progress the medium. This is a striking example illustrating how a game can be abruptly removed from storefronts, with no indication of a return. This provides us with clear evidence that we are unable to assume that digital distribution is a sign that a game will be widely accessible in perpetuity due to corporations having no interest in the past, instead focusing on things in the present that are like the past (Salvador, 2024). Exploring the role cultural heritage institutions can play to help address this accessibility problem for digital games beyond relying on commercial availability and understanding the institutions' current strategies to preserve access to such games are critical.

Need 4: Obsolescence and degradation of physical artifacts is a major risk for games preservation. The risks of disappearance also exist for physical game-related artifacts. Limited distribution emerged as early as the second console generation, with some Atari games being distributed in such small quantities that they have been rediscovered, like *Hobo* (unlisted) in 2011. This does not account for completed prototypes or localizations that never made it to market. These factors culminate in an urgent need to document current preservation and access options provided by cultural heritage institutions, as well as developing a roadmap for improving historic game accessibility for games that are critical to educators and researchers. In addition, we also need to guide these individuals in determining how to access a game that has garnered their interest, and through which institution. This can also help cultural heritage institution personnel better assist in providing access to games while navigating DMCA guidelines, even for those who may not be familiar with games.

Target Groups and Beneficiaries: We have identified three target groups: 1) Information professionals including librarians/archivists/museum professionals, 2) Game historians/Researchers, and 3) Game developers/Educators. Through these three groups, we will be able to identify what games are considered as critical and in need for preservation for their game related work of these stakeholders, understand the current challenges regarding access to digital games and game artifacts at cultural heritage institutions, and work towards establishing meaningful resolutions to these emergent issues.

1) Information Professionals: Our work will have the most direct impact on this group consisting of librarians, archivists, and museum professionals who manage game and game artifact collections, as we will be investigating the current access methods employed by their respective organizations regarding games and related artifacts. By documenting the current archival and access procedures of domain experts, we can develop a sustainable long-term approach to preserving and providing practical access to these items. The best practices guide developed in this process will help reduce the burden on information professionals in terms of the amount of specific domain knowledge they need to manage the accessibility to their game collections while also laying the groundwork towards providing access to game artifacts through emulation, reducing access barriers for the public, and increasing utilization of these public services.

2) Game historians and researchers: These stakeholders also have the specific domain knowledge regarding various game artifacts dependencies, be it hardware or software, and will be able to provide guidance on how best to resolve existing issues regarding the artifacts' current accessibility methods. Additionally, they are positioned to have insights regarding critical games from a specialist user perspective. Game historians and researchers will benefit from this study as we can offer improved transparency regarding games and game-related artifacts held in different collections, as well as mitigating situations where a game itself may be available but the necessary hardware is not. If digital solutions for access are adopted, it can help historians and researchers when seeking less commercially successful artifacts by removing physical location barriers.

3) Game developers and educators: These stakeholders comprise our third target group, as the increased accessibility will have significant impact on game-related education programs and will set the stage for more meaningful reflection and inspiration from predecessors of the medium. Currently, the vast majority of game educators obtain their positions through proven work experience, and many veterans of the game development industry pursue intellectual means of advancing their trade in lieu of traditional educational outlets due to the availability of programs. Groups like Project Horseshoe (2019) served as an outlet for the fields lacking in traditional academic representation, filling a necessary gap while graduate and undergraduate educational programs began introducing games-related programs. As such we have combined these two groups as there is a significant overlap in their access needs, and due to their roles as creators instead of consumers of the medium, which we expect will influence their identification of critical games. There is also an expectation that age will be a large factor in differing responses, as it is uncommon for gamers to participate in consuming games that pre-date the games they were initially introduced to. In addition to the benefits received by game historians/researchers, game developers/educators will be able to incorporate the best possible examples (both positive and negative) of existing ideas, systems, or concepts into their coursework, instead of being limited to what is commercially available when developing the design of their curriculum.

In addition to the target groups above, we believe that students will comprise a large section of our beneficiaries. This is due to the fact that increased accessibility of games and game related artifacts will improve the quality of game education programs, which are on the rise at accredited institutions. This investment in reference materials for future generations will have a substantial impact on the quality of future output in the medium, as games draw inspiration from the world around them and the games that came before them. This increased exposure to divergent milestones within game history will increase the breadth of what students will be exposed to, providing a broader understanding of possibilities within the medium.

II. Project Work Plan

A. Research Objectives

The current work plan intends to identify the gaps in practical accessibility offerings of cultural heritage institutions regarding digital games, as well as the exploration of the games important for education and game development history. We will use a mix of qualitative and quantitative approach, employing interviews and an online survey, to organize our findings and analyze responses from our participants. In particular, we aim to answer the following research questions:

RQ1. What kinds of games do domain experts describe as critical games for game research, education, and design, and what kind of characteristics do they have? How accessible are these games?

RQ2. What are the current practices of information professionals for investigating the accessibility of games? What can we learn from game researchers and educators as their best practices for accessing games?

RQ3. In what ways are we able to improve the access to critical games across different cultural heritage institutions?

The major contributions of our research are as follows: 1) an improved understanding of what game experts consider as critical game for their game research and education and why, and how to access them, 2) a broader assessment of the overall challenges in game accessibility in the U. S. and documenting best practices in navigating accessibility issues, and 3) practical insights on how cultural heritage institutions can help improve the game accessibility.

B. Project Team

Core Research Team: The Principal Investigator, Dr. Jin Ha Lee, will be responsible for planning, executing, and managing this project. The doctoral student researcher, Lane D. Koughan, will perform interviews, collect and code the user data, and coordinate the data analysis with our research partners. The VGHF and The Strong

National Museum of Play will act as close collaborators in the data analysis and dissemination of the research outcomes. We had a preliminary discussion with Phil Salvador of the VGHF (Library Director at the VGHF) and Jon-Paul Dyson of The Strong National Museum of Play (Vice President for Exhibits), which helped us expand and reprioritize the focus of this study from the discovery and classification of critical games to identifying practical accessibility within cultural heritage institutions. Both individuals voiced concerns regarding current game and game artifact curation, and challenges accessing legacy items, even if the game itself was on hand. Salvador has agreed to the expected work plan and timeline. Dyson has also agreed, and expects to work on this project with Andrew Borman, the Director of Digital Preservation, and Lindsey Kurano, their Curator of Electronic Games (See Appendix B: Statement of Work).

PI Lee has a deep expertise in games and game artifact preservation, and her research lab (GAMER Group), has an extensive history of working with external partners who are the focal point of the topics researched. The [VGHF](#) is a well-known non-profit organization leading efforts in expanding awareness regarding the preservation of game related materials, and the concerning state of game availability on modern platforms (Lewin, 2023). They were key collaborators of the GAMER Group in a previous IMLS-funded project (LG-86-18-0060-18) on developing a conceptual model for curating video game development artifacts. [The Strong National Museum of Play](#) is a specialized institution serving as a central pillar in the game preservation and research community. They are familiar with the struggles of researchers, archivists, and museum curators in relation to accessing, and preserving these young forms of media. Members of The Strong have also served on the advisory board of the previous IMLS-funded project, demonstrating our positive relationship.

Advisory Board: To guide our research, we have formed an advisory board consisting of members of our target user populations who will review and provide feedback on project activities. We will meet with them three times (beginning, end of Year 1, and end of project) in Zoom, and may reach out to them for further guidance on specific topics as needed. They will provide input in the project direction as well as development of our interview and survey instruments to ensure tangible benefit of our research to our target audiences. They will also assist with recruitment of participants and dissemination of our findings. Members include:

- **Dr. Henry Lowood** is the Harold C. Hohbach Curator for History of Science & Technology Collections and the Curator for Film & Media Collections in the Stanford University Libraries at Stanford University. He was one of the key contributors to the work done for *Preserving Virtual Worlds*.
- **Ian Schreiber** is a co-author of *Game Balance* and *Challenges for Games Designers: Non-Digital Exercises for Video Game Designer*, both influential writings on game design. Ian also worked as a game design professor at Savannah College of Art and Design and Rochester Institute of Technology since 2008.
- **Jay Schnider** is a current board member and senior instructor of the UW Continuing Education Game Design Program. His previous work includes creating digital versions of physical games for Wizards of the Coast (notably reimagining Magic the Gathering into Duels of the Planeswalkers).
- **Dr. Travis Willingham Windleharth** is a Senior Researcher at foundry10, a non-profit education research organization aimed at supporting youth. He engages with a large number of game developers and educators, especially those focused on developing games for learning.

C. Relevant Efforts at Other Institutions

Previous work documented in *Preserving Virtual Worlds* (McDonough et al., 2010) highlighted issues and recommended actions regarding game preservation efforts, particularly calling for action in the library space with the creation of repositories and supporting documentation regarding game artifacts. Winget also examined the creation process and artifacts of the video game industry through observation and interviews with game developers (Winget & Murray, 2008; Winget & Sampson, 2011). While these projects set the preliminary groundwork for game organization and preservation, the issues of accessibility due to obsolescence and intellectual property laws have not yet been sufficiently addressed regarding the access of

game artifacts. Artifact obsolescence, degradation, and intellectual property laws are complex issues requiring specialized domain knowledge to meaningfully navigate and it is unreasonable to expect and/or assume that all librarians and museum professionals (curators and conservators) will have knowledge within these spheres. As such we want to identify the existing and emergent gaps to preemptively address these issues before the existing media fail due to part failure, disc rot, and the like.

Later, the GAMER Group developed the [Video Game Metadata Schema](#) (Game Research Group, 2016; Lee et al., 2017) and a conceptual model for games (Jett et al., 2016) as a means of standardizing and improving general accessibility and navigation of games as information objects within the growing space. Following that success, the GAMER Group led the project focused on better [describing and organizing video game development artifacts](#) (McDonald et al., 2020) in collaboration with VGHF and UW Libraries. Additionally, GAMECIP, a joint project led by the University of California, Santa Cruz Library, UCSC Computer Science, and Stanford University Library, investigated metadata requirements and citation practices for computer games in institutional collections, resulting in a schema and best practices guide to enhance library and institutional procedures for computer games (De Groat et al., 2015; The Online Audiovisual Catalogers, 2015). These projects focused on better description and organization of games and game-related artifacts. Building upon their work, we aim to more deeply investigate accessibility issues from the perspectives of different domain experts, especially for what they consider as critical games in research, teaching, and design.

It is also worth drawing attention to the limited scholarship surrounding game design, most notably the PENS (Rigby & Ryan, 2007) format, which indicates how to make a game people will buy instead of a well-designed one, and LeBlanc's MDA (2004) format, which is vague on evaluation criteria. The large majority of curated lists of important games are based on total units sold or popularity with the general public. However this is far from an indicator of impact on the development of games as a creative medium. The game Undertale (2024) is a wildly successful RPG that was coded entirely by one person and has an estimate of 7.12 million units owned (SteamDB, 2023) just through Steam. It was largely inspired by Earthbound (2024), a cult classic RPG, Touhou Project (2024), a series of Bullet Hell games made by hobbyists and distributed through fan conventions in Japan, and Moon: Remix RPG Adventure (2024), an incredibly obscure non-combat RPG released only in Japan until 2020. None of these games had impressive sales numbers, yet they served as the progenitors of what would become a pop-culture sensation. Our research will help discover more about what kinds of games are considered important for our stakeholders and why, beyond the metric such as their commercial success.

Furthermore, the complications of IP ownership, asset licensing, and distribution mean there is little to no assurance that games critical to game education will be widely accessible, thus constraining growth and artistic expression of this cultural product. We hope to specifically address this challenge and work towards a viable solution involving cultural heritage institutions in our project.

D. Preliminary Research

In 2023, when Salvador and the VGHF were investigating the availability of historic games, we were asked to help perform a concurrent analysis of their findings to verify the results. The goal of this project was to help generate supportive data for discussion at the triannual DMCA hearing in 2023 (Lewin, 2023). To support these efforts, we conducted interviews regarding access of historic games under fair use, with a focus on game educators. Through these interviews we identified a common thread around the inability to provide access to ideal examples. As discussed above, they were often using games that are more easily accessible rather than the best examples of games they could use in their curriculum. Game educators pointed to particular examples of games which they consider as critically important for their work and also in the history of game development. They often articulated the importance of these games by explaining the influence of the work on future developments in the game field. However, this project also revealed how classic video games released in the U.S. are critically endangered with most inaccessible in the current marketplace (Lewin, 2023). Lewin calls

for the importance of libraries and archives as a venue to make these games accessible to any researchers, historians, educators, and fans. This scarcity of historic games, with only 13% accessible on current commercial platforms, underscores the need to assess current access conditions. It also highlights the necessity to establish future paths, and the role cultural heritage institutions can play, to ensure accessibility to these crucial games as they are identified. Our research directly responds to this call and aims to improve our understanding of game accessibility issues and strategies for navigating accessibility issues in cultural heritage institutions.

E. Schedule and Outcomes

We propose a two year research project with the first year focusing on collecting the interview data from participants representing three different user groups as a narrower and curated subset, and the second year focusing on deploying a larger scale online survey to verify the initial insights from the interviews with the larger audience. This presents us with an opportunity to iterate our design of the research instrument to reflect emerging insights in between the two stages for better data collection. For both of our interviews and online survey, we will receive the IRB approval from University of Washington before recruitment of participants and the data collection (see schedule of completion for more information). Interviewees will be compensated with \$50 gift cards and survey participants can enter to win a raffle to receive one of 10 \$100 gift cards.

Timeline	Goals	Methods	Activities	Outcomes
Year 1	1) Identify critical games and their accessibility [Answering RQ1]	User interview	- Conduct in-depth interviews of approx. 40 users representing three target groups (information professionals, game researchers/historians, game developers/educators) to understand access needs and difficulties	1) Comprehensive list of game that are considered critical to game history and education 2) Report on the challenges in accessing critical games and user strategies in accessing them, as identified in interviews [Part I of the white paper]
	2) Identify common characteristics of nominated critical games [RQ1]		- Organize the games with metadata and accessibility information for each game	
	3) Document current practices for accessing critical games [RQ2]	Thematic analysis	- Analyze interview data to understand 1) which games are considered critical and why, 2) their common characteristics, and 3) how people access such games	
Year 2	Verify the interview findings with the wider audience [RQ1 and RQ2]	Survey	- Conduct a large-scale survey (approx. 300 responses) to confirm alignment with interview data	1) Expanded list of critical games 2) Report on game access challenges and user strategies, as identified in the survey [Part II of the white paper]
		Descriptive analysis & Thematic analysis	- Analyze survey data to understand 1) which games are considered critical and why, 2) their common characteristics, and 3) how people access such games	
	Explore how to improve game accessibility across different cultural heritage institutions [RQ3]	Thematic analysis	- Analyze all data to create a framework illustrating different aspects to consider in improving game accessibility - Gather information about game collections in different cultural heritage institutions - Summarize the findings and interpretations in the paper	1) Game access management best practice guide, including collection information at different cultural heritage institutions 2) Research paper reporting the findings

Year 1

Method: We will employ a qualitative approach during the first phase of our exploratory research. We will primarily focus on collecting information regarding difficulties in accessing critical games, best practices in how to investigate if a game is accessible, and a comprehensive but non-exhaustive list of games that, if accessible, would improve the quality of education within the game design space. The data will be collected through recorded interviews with domain experts. The results will be analyzed to understand common characteristics in games identified as important for these stakeholders as well as accessibility methods for these games and game-related artifacts. It will also help develop a broader survey that will be deployed in year 2.

Recruitment: Our research partners from VGHF and The Strong will assist with identifying interview candidates, and analyzing the interviews. In sourcing respondents, we will also leverage our connections with the international game historian and museum community through a quarterly recurring call organized by Dyson. For game developers and educators, Schnider, the head of UW's Game Design Continuing Education program, has agreed to help connect us to their network. The student researcher Koughan is also an active member of the IGDA, and can network within that sphere in alignment with our diversity plan, as they already have sub-groups to support networking and representation of diverse backgrounds. The librarian and archivist community has some overlap with the game researcher community that we are a part of, and the PI Lee will source additional participants from her network within the game preservation research community.

Due to the anticipated difference in volume of our target groups, we are aiming for 10-12 participants from librarians/archivists/museum curators, 12-15 participants from game historians/researchers, and 15-20 participants from game developers/game educators. Cultural heritage participants will be prioritized based on the nature and size of their institutions' game artifact collection, historians/researchers based on their contributions to published works, and game developers/educators based on the community's reception of their published works, including games, conference presentations, articles, and textbooks. Potential respondents' cultural makeup will influence how these criteria are weighted (e.g., a younger developer with a couple of notable titles is more significant than a retired industry veteran with 20 that were not nominated games).

Data collection: We anticipate interviewing approximately 40 individuals across different stakeholder groups, aiming to reach saturation in our data. We will recognize saturation when there are no new critical insights or perspectives, and the themes we derive become repetitive and consistent across the interviews (Fusch & Ness, 2015). These interviews, expected to last roughly an hour, will be held over Zoom.

Interview questions will vary slightly between our target audiences, with current collection questions and access methods and difficulties being the primary context for stakeholders in cultural heritage institutions (e.g., What kinds of game or game artifact collections do your institution hold? What kind of access do you offer to those collections? What are some challenges your users experience in accessing the collections?), and critical game identification and accessibility methods being asked to game developers/educators (e.g., What are examples of games that you consider as critically important for your work or in the history of video games? Can you explain why they are important? What kinds of influences did that game have in game development? Are you able to access those games? If so, from which institution and by using what mode of access?). A mix of both will be asked of game researchers/historians who will have ideas about what games are important and also may have their own personal strategies for accessing games of their interest they can share.

Coding and analysis: After the interviews have been completed, the recordings will be transcribed. The transcripts will be coded through thematic coding (Terry & Hayfield, 2021) aimed to identify patterns and themes within the data. We will use [Atlas.TI](#) for this coding process. Our research partners at VGHF and The Strong will participate in this process to incorporate their relevant area expert insights and interpretations of the interview results for more holistic analysis. The codebook will be generated inductively via an iterative process (Strauss & Corbin, 1998). For access-related questions, our coding will aim to group like barriers

together (artifact availability, dependent artifact availability, artifact condition, etc.). For critical games, we intend to weigh games with multiple responses as more critical than counterparts. The analysis will reveal what characteristics of the games lead them to being considered as critical games by the participants. We may follow up with willing participants for additional clarification if needed. PI Lee has an established history of user-centered knowledge organization research, and will guide the research team in this data analysis process.

Dissemination: The critical games nominations will be analyzed to determine possible shared characteristics of critical games, and nominations will be shared via the [GAMER Group's website](#) which is publicly accessible. We will be taking special note of reception of nominated critical games at release, direct sequels (by title), indirect sequels (by mechanics from the developer), and derivative titles (shared mechanics from different developers) among other emergent characteristics discovered through an investigative dive into the situations that brought about nominated critical games. A report summarizing the findings from the interview will also be released via the GAMER Group's website. This will be the Part I of the eventual white paper which will be published and also released on the same website.

Year 2

Method: After completion of the interview data analysis in the first year, we will focus on developing and distributing the follow-up survey to confirm whether the insights captured from our interviews appropriately reflect the target audience population at large in Year 2. The wider survey will allow us to establish quantitative metrics for our findings from the first year. The findings from the survey will improve our understanding of the access needs of larger populations of researchers and industry professionals, as well as existing issues accessing games through current preservation methods at cultural heritage institutions.

Recruitment: The survey will be distributed to a significantly wider audience (target approximately 300 responses with 50 information professionals, 100 game researchers/historians, and 150 game developers/educators) through postings and dissemination in domain specific channels (IGDA special interest groups), message boards, and mailing lists (Dyson's game preservation mailing list), and professional networks within academia. The advisory board member, Windleharth, also has connections with a local game design college DigiPen as well as a substantial number of game educators and industry professionals we can leverage for recruitment. Additionally, [WebJunction](#) will assist in the recruitment process by distributing the survey invitations to their network of libraries and museums via their website, social media, and newsletter. We are also reaching out to Valve to see if they will disseminate our survey to their developer list.

Data collection: The survey instrument will be created largely based on the interview data. Some of the interview questions will be repeated in the survey; for instance, the games that stakeholders consider as critical, their justification and how they currently access such games. We will also ask them about general challenges they experience in accessing games they need for their work. Response options for some questions will be determined by the variety of responses from the interviews. Other questions may be added based on the key themes identified from the interview data analysis.

Coding and Analysis: Using Qualtrics, we will report basic descriptive statistics of closed-ended and demographic questions. Responses from open-ended questions will be coded using Atlas.TI, following a similar thematic analysis process as the interview data.

Dissemination: A report summarizing the findings from the survey will be released via the GAMER Group's website, which will be Part II of the white paper. We will also collaborate with the VGHF and The Strong to create a best practices guide to aid in the spread of tools/approaches to see if a game is reasonably accessible at cultural heritage institutions, as well as detailing the types of collections held within them. This will be available for download through the UW GAMER Group website. We also anticipate this being distributed through Dyson's game preservation mailing list, the VGHF's discord, and the IDGA message boards. Additionally, our research findings will be reported in academic publications, easily accessible to practitioners.

III. Project Results

The primary contribution of this work will be the findings regarding practical digital game accessibility in cultural heritage institutions, emergent barriers to said accessibility, and an initial cataloging of games that are available at participating institutions. The compiling of these details will not only help identify gaps in current archival/access procedures regarding critical games, but also provide guidance on options for mitigating said issues. The cataloging of collections held at cultural heritage institutions will address issues around transparency regarding the contents of said collections, empowering researchers in their search for relevant materials to their work. Sharing knowledge about best practices and emerging dependencies of certain artifact types will help alleviate current challenges faced by librarians, archivists, and museum professionals in investigating and ensuring access to game artifacts within their collections. Additionally, detailing potential alternatives can provide valuable insights and strategies for addressing these challenges effectively.

In addition to the above addressment of needs, we will also begin the curation of the critical games list, and generate identifiable criteria for recognizing and classifying these games. This will aid in the preservation of influential artifacts, ensuring their maintained access for future generations, as well as serve as a template to identify significant at-risk items that warrant additional resource allocation towards their preservation. In our future work, we plan to collaborate with select game educators by providing our list of critical games and evaluating their relevance and usefulness in terms of improving access to sample games and the quality of their teaching. After dissemination, the impact of best practices guide will also be measured by seeking expert evaluation through focus groups at The Strong and other institutions and also by tracking usage metrics.

Dissemination: We intend to present our research at a mix of venues focused on museums, libraries, and games to promote appropriate distribution of our findings. Prospective events include Save the Games Digital Preservation Symposium, ALA games roundtable, Washington Library Association conference, Annual Meeting of the Association for Information Science and Technology, iConference, and more. We also intend to establish an open-access repository (either through [GitHub](#) or [OSF](#)) to host all of our materials for use by the general public, including the best practice guides for information professionals like librarians, archivists, etc.

Sustainability: After disseminating our work via our website and public repository, we anticipate that we will provide updated guidelines and criteria. As this is intended to be a living resource to facilitate researcher needs, the GAMER Group will continue to be responsible for the maintenance and update of the resources. During the project period use guidelines and documentation will be developed and added as a readme file to the repository. We expect the continuously updated artifact dependency and care materials to ease the burden on existing librarians, archivists, and museum professionals who may lack specialized historic electronics knowledge to perform their duties with confidence and efficiency.

IV. Diversity Plan

Many of the veterans in the game design domain are older Caucasian or Japanese men, largely due to how young the digital games industry is and the contributions to the medium from these territories during the formative years between the 70's-90's (Chee, 2021). However during the 2010's significant efforts were made to diversify the representation within the games industry (Chee, 2021). As a result of the aftereffects of these original biases, we intend to make focused efforts of reaching out to experts from various backgrounds, race and ethnicity, gender, countries, and eras in our study. There are also concerns regarding generational relevance of critical games, and as a result we intend to sample game developers and educators from a generational lens, anticipating increased documentable cultural and gender diversity from the newer generations of this group. We will reach out to smaller coalitions of representation demographics (e.g., [BIG Foundation](#), [ABRAGAMES](#)) to distribute the survey to a wide audience of diverse backgrounds and ethnicities. This will be in partnership with the IGDA, who already provides interest groupings for minority representation, as well as other organizations and coalitions not affiliated with the IGDA.

Schedule of Completion

Schedule of Completion									
Timeline	Activities	2024-2025				2025-2026			
		Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer
Year 1	Identify and recruit domain experts as potential interviewees								
	Develop interview instrument, pretest								
	Get an IRB approval for the interview								
	Conduct user interviews								
	Analysis of interview data								
	Write a report of findings from the interview data								
Year 2	Develop survey instrument to evaluate model/schema, pretest								
	Get an IRB approval for the survey								
	Launch Survey and collect data								
	Analysis of survey data								
	Write a report of the findings from the survey data								
Multiple Years	Research work sessions with collaborators								
	Quarterly check-in meetings with collaborators								
	Compile a list of critical games (including common traits)								
	Create best practices document based on all user data								
	Updating the online repository/GAMER Group's website								
	Dissemination via conferences, journals, and other events								

Note: Shaded bars represent an activity's most intensive period; in practice, activities may begin before and extend beyond

Digital Product Plan

Type

We will be creating the following four types of digital products for distribution:

- A list of the critical games as identified by the study participants with appropriate game metadata (applying the elements from the [Video Game Metadata Schema](#)) and each game’s accessibility information (e.g., which institutions holds the game and/or game-related artifacts; what kind of access is possible)
- Best practices document for navigating accessibility issues related to games and game development artifacts in cultural heritage institutions with a list of libraries, museums, and archives in the U.S. maintaining substantial game collections and accessibility of those collections
- White paper on findings from the user interviews and survey summarizing the main insights on accessibility of critical games (encompassing the two reports generated for interview and survey data, respectively)
- Research publications in academic journal or conference proceedings

Availability

- The list of critical games will be made available through [the UW GAMER Group’s website](#), as well as an open access repository through [GitHub](#) or the [Open Science Framework \(OSF\)](#).
- The best practices document for providing access to games and game development artifacts in cultural heritage institutions will be made available for access and download through [the UW GAMER Group’s website](#), as well as an open access repository through [GitHub](#) or [OSF](#).
- The white paper will be published on [the UW GAMER Group’s website](#) and [OSF](#) Preprints.
- The research publication will be distributed through the regular publishing channels associated with the venue. Additional links to the publications will be posted to [the UW GAMER Group’s website](#) on the publications page. The preprints of the publications will be disseminated via [OSF](#) Preprints.

Access

- We intend to use the [Creative Commons License](#) CC BY-NC-SA which allows “reusers to distribute, remix, adapt, and build upon the material in any medium or format for noncommercial purposes only, and only so long as attribution is given to the creator”. This will allow for open access and updates to the list of games as well as potential expansion if a future need arises.

Sustainability

- After the project period is complete, the digital materials will still be hosted through [the UW GAMER Group’s website](#) and maintained by the GAMER Group. The list of games and best practices guides are also going to be made available via [GitHub](#) or [OSF](#) to further support sustained access to the materials.
- The white paper will be available through not only [the UW GAMER Group’s website](#), but also [OSF](#) for increased sustainability.
- Research publications will be preserved through physical and digital archiving and availability employed by the venues. The preprints will be preserved in [OSF](#) Preprints.

Data Management Plan

Identify the type(s) and estimated amount of data you plan to collect or generate, and the purpose or intended use(s) to which you expect them to be put. Describe the method(s) you will use, the proposed scope and scale, and the approximate dates or intervals at which you will collect or generate data.

We will be collecting the following types of data for this project:

- Interview data: Audio/Video recordings of interviews; transcripts of the interviews; post-interview reflection notes; codebook

All the interviews will be conducted online using Zoom. The audio/video recordings of the interviews will be captured in Zoom. We will use the automatic transcription feature in Zoom for generating the initial transcript which will be reviewed and revised for accuracy by the research team members. The interviewer will take reflection notes after each interview to capture the emergent insights during the interview process.

The codebook will be created iteratively during the data analysis process. The transcripts and reflection notes will be coded in Atlas.TI.

We expect the interview data to be collected over two quarters--Autumn 2024 to Winter 2025 (approximately six months).

- Survey data: Online survey responses; report generated from Qualtrics; codebook

The online survey will be deployed using Qualtrics. The raw survey responses will be downloaded in the spreadsheet for additional analysis such as coding the open-ended responses. We will also use the report generated in Qualtrics which summarizes the survey responses and gives an overview of the data.

For analyzing the open-ended responses, we will inductively create a codebook. The open-ended responses will be coded in Atlas.TI.

The survey responses will be collected for about a month in Autumn 2025.

- Game data: List of critical games with metadata and accessibility information

We will create a spreadsheet of the game as identified by participants, along with basic game metadata (e.g., title, publisher, platform, etc.) for each game and accessibility information (e.g., location of institutions, access mode, etc.).

Will you collect any sensitive information? This may include personally identifiable information (PII), confidential information (e.g., trade secrets), or proprietary information. If so, detail the specific steps you will take to protect the information while you prepare it for public release (e.g., anonymizing individual identifiers, data aggregation). If the data will not be released publicly, explain why the data cannot be shared due to the protection of privacy, confidentiality, security, intellectual property, and other rights or requirements.

Data will be collected with the informed consent of participants following the protocol approved by the University of Washington Institutional Review Board. Only the name and the email address will be collected for the interview participants and a small number of survey respondents (who won the raffle) for the purpose of tracking the payment to the participants. This information will be stored separately from the interview and survey data. The participants' data will be anonymized in reports and publications. We do not anticipate capturing any confidential, or proprietary information through our interviews.

What technical (hardware and/or software) requirements or dependencies would be necessary for understanding retrieving, displaying, processing, or otherwise reusing the data? How can these tools be accessed (e.g., open-source and freely available, commercially available, available from your research team)?

All the hardware and software necessary for this research are provided by the University of Washington Information School. The research team will be using workstations provided by the UW Information School. We will use Zoom for our interviews, and Qualtrics for deploying our survey. We will use Atlas.TI for coding our interview transcript and open-ended survey responses. The University of Washington Information School provides licenses to use all of these applications for our research. We will use a shared Google Drive with limited access to only the research team members and close collaborators in the Video Game History Foundation and the Strong Museum of Play.

What documentation (e.g., consent agreements, data documentation, codebooks, metadata, and analytical and procedural information) will you capture or create along with the data? Where will the documentation be stored and in what format(s)? How will you permanently associate and manage the documentation with the data it describes to enable future reuse?

For interviews, the consent agreements will be captured via signed form or verbal consent prior to the data collection. For the survey, the consent information will be displayed at the beginning of the survey before the participants agree to proceed to answering the questions.

Codebook, analytic notes, and other documents that are generated during the project will be stored in the shared Google Drive for the research team members.

Game metadata will be captured in the shared Google spreadsheet which will also be stored in the Google Drive. The spreadsheet will be made accessible publicly when the initial list, based on the interview and survey data, is completed. It will be updated throughout the project but still be accessible.

What is your plan for managing, disseminating, and preserving data after the completion of the award-funded project? If relevant, identify the repository where you will deposit your data. When and for how long will data be made available to other users?

Research findings will be made available to the public via a white paper (encompassing reports from Year 1 and Year 2) and academic publications. Both the white paper and any pre-prints of academic publications will be deposited to OSF Preprints and made available publicly. The list of critical games with metadata and accessibility information will be made available via the UW GAMER Group's website as well as a publicly accessible online repository such as GitHub or OSF. The GAMER Group's website will provide links to all publications in different repositories.

When and how frequently will you review your Data Management Plan? How will the implementation be monitored?

The Data Management Plan will be reviewed semi-annually, as this aligns with deliverable milestones. The implementation will be monitored by the PI and the student researcher through regular weekly meetings. We will discuss what data needs to be collected and analyzed, and check the accessibility of the user data to the research team.