University of South Carolina
Scholar Commons

Theses and Dissertations

Fall 2023

A User Needs Assessment For Snowvision/World Engraved

Sam Toren McDorman

Follow this and additional works at: https://scholarcommons.sc.edu/etd

 Part of the Anthropology Commons

Recommended Citation

McDorman, S. T.(2023). *A User Needs Assessment For Snowvision/World Engraved.* (Master's thesis). Retrieved from https://scholarcommons.sc.edu/etd/7530

This Open Access Thesis is brought to you by Scholar Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Scholar Commons. For more information, please contact digres@mailbox.sc.edu.

A USER NEEDS ASSESSMENT FOR SNOWVISION/WORLD ENGRAVED

by

Sam Toren McDorman

Bachelor of Arts
University of South Carolina, 2018

Master of Library and Information Science
University of South Carolina, 2023

Submitted in Partial Fulfillment of the Requirements

For the Degree of Master of Arts in

Anthropology

College of Arts and Sciences

University of South Carolina

2023

Accepted by:

Adam King, Director of Thesis

Karen Y. Smith, Director of Thesis

Courtney Lewis, Reader

Ann Vail, Dean of the Graduate School

© Copyright by Sam Toren McDorman, 2023
All Rights Reserved.

Acknowledgements

This study would not have been possible without the hard work of the UofSC-based SV team who built the algorithms, database, and website. I joined the team in August of 2018 and since that time it has included: Karen Smith, Song Wang, Colin Wilder, Yuhang Lu, Jun Zhou, Deja Scott, Jake Bukuts, Sydney Miyasaki, Canyu Zhang, and Rabab Abdelfattah. Scott, Bukuts, and Zhou built the current WE front and back end, ensured the system was operational during user testing, and adjusted or completely reworked many aspects of the system in response to user feedback. Lu and Zhou created the SV algorithms and processed sherd data needed for the study. I am grateful to Dr. Anna M. Semon, Nancy M. White, Matthew C. Sanger, Lindsay Bloch, and Jake Holland-Lulewicz for participating in the user testing interviews and providing valuable project feedback.

The SV project would not exist without Karen Smith at SCDNR, and I am thankful for her inviting me to join it. When I met Smith in the Fall of 2017 to talk about the project, I knew the idea was a good fit for my research interests. I could not have imagined how much my involvement in the project would shape my career and confirm that my interests are firmly rooted in the intersection of archaeology and information science. The training I have received from Smith has extended well beyond the SV project into many other aspects of

archaeology, and I am grateful for her patient mentorship and guidance. In the Spring of 2017, Andy White's field school converted me over to archaeology from biological anthropology. I gained valuable field and laboratory experience working with him after the field school, and he recommended me to Smith for the SV project. His semester long, one day a week field school accommodated me as a non-traditional student and changed the path my life was on. I cannot imagine being anywhere else.

Adam King at SCIAA stepped in as my committee chair in 2020 when White departed UofSC, cheerfully agreeing to hop onto an unusual dual-degree thesis project that was already in progress. King provided much needed encouragement during the writing process and never complained when I forgot to send paperwork in a timely manner. Courtney Lewis was an influential professor for me as an undergraduate and I am grateful for her assistance as a committee member. Lewis provided valuable feedback whenever it was needed and agreed to stay on my committee even though she has left UofSC Anthropology Department for Duke University. Elise Lewis provided early thesis project feedback. When she was part of the UofSC School of Information and Library Science, she inspired both the idea to pursue dual master's degrees in anthropology and information science as well as the idea of a user needs study as a thesis project.

While the names of the original paddle artists have been lost to time, their designs remain impressed on pottery in middens and ceremonial spaces across the southeast. The Snowvision project would not exist without the reconstruction

work of Bettye J. Broyles and Frankie Snow. Both spent years creating the SCCS designs that are the backbone of the Snowvision project. Snow has graciously allowed access to his full design catalog and given permission to use designs in publications, presentations, and the matching algorithm. Broyles' designs are controlled by UGA, and they have allowed us to use the designs freely and to publish them on the World Engraved website. With assistance from UGA's Amanda Roberts Thompson, we have started consultation with RaeLynn Butler and LeeAnne Wendt of the Muscogee (Creek) Nation to scan and publish the sherds that Broyles used to reconstruct designs. Working with these beautiful designs has been a privilege, and I am excited that WE will bring this art to the public.

Gail Wagner (UofSC Department of Anthropology, retired), Chris Judge (UofSC Lancaster Native American Studies Center), and Adam King provided me with two summers of work as a graduate student and have offered access collections for inclusion in the SV project. Keith Stephenson with SCIAA has shared vessels from 9PU10 and has been a great resource when I have questions about the classification of complicated stamped ceramic types. Accessing these collections has given me experience preparing sherd data for SV/WE and manually reconstructing designs. Scott Jones has shared knowledge about paddle stamping, primitive technology, and friendship.

My friends and coworkers have provided a great deal of support during this project. Arthur Flatau and Will Pitt have been with me through more than two decades of growth, changes, and challenges. I am profoundly grateful for their

friendship and have relied on their support these last few years. Paul Slaugh has been a true friend since I met him early in my days at Pikes Peak Community College, and I enjoy doing some extra research to answer his frequent and unusual questions about the past. Fieldwork across South Carolina with the crews from SCDNR and SCIAA gave me needed breaks from the classroom and reminded me that there is life outside of graduate school. SCDNR work at the Pockoy Island Shell Rings, organized by Meg Gaillard, Karen Smith, and Sean Taylor, expanded my archaeological interests and instilled me with a deep appreciation for Edisto Island, South Carolina. Time spent on Edisto has been some of the best of my graduate experience.

Trista Goss, my “little sister,” has been consistent in her support during this process. She ensured there was no shortage of fun outings and good food during my summer trips to see family. Trista and her son, Zander (Alexander) Binkney, kept me grounded when my grandfather passed while I was starting the last two chapters of this thesis. My grandfather, Gerald Duane McDorman, spent the first 5 months of 2022 in South Carolina with my family. I cherished that time with him, and I am so glad he got to see how much I have accomplished before he passed. My parents, Mary and Dale McDorman, encouraged my interests in science, history, art, and literature from the start. I was an early and avid reader who was full of questions, and my parents made sure I had access to books and people that could answer my inquiries. It took me a while to get around to college, but they both knew that this was something I would do eventually and have supported me with whatever I have needed. I know they are proud of me,

and they never doubted I could finish this. They did their best with a kid who was eager to learn, fascinated by museums, and loved playing in the dirt.

Abstract

Paddle stamped pottery has a long history in what we now call the southeastern United States. From 100-800 CE, intricate curvilinear designs were carved into paddles and impressed in ceramic vessels in Georgia, Florida, Alabama, Tennessee, and South Carolina. Called Swift Creek Complicated Stamped, this type has been long recognized by archaeologists for its uniqueness. Artists Bettye J. Broyles and Frankie Snow reconstructed hundreds of paddle designs from sherds and modern archaeologists use these designs to study the movements and connections of the people who made the pottery. The Snowvision team has developed a machine learning computer vision algorithm to assist with design matching and the World Engraved submission website and digital archive (www.worldengraved.org). This thesis is a two-part user needs study for the Snowvision project and the World Engraved website.

Table of Contents

List of Figures

List of Abbreviations

CC.....Creative Commons

DINAA.....Digital Index of North American Archaeology

MURR..... University of Missouri Research Reactor Archaeometry Laboratory

NEH..... National Endowment for the Humanities

NSF.....National Science Foundation

RBS.....River Basin Survey

SCCS..... Swift Creek Complicated Stamped

SCDNR.....South Carolina Department of Natural Resources

SCIAA..... South Carolina Institute of Archaeology and Anthropology

SV..... Snowvision

UF.....University of Florida

UGA.....University of Georgia

UofSC.....University of South Carolina

WE.....World Engraved

WPA.....Works Progress Administration

YBP.....Years Before Present

Chapter 1: Introduction

SCCS pottery is an active area of archaeological study and has been a focus of researchers for more than 100 years. SCCS was made from approximately 100-800 AD in what is now called the southeastern United States. SCCS is the most intricate and complex complicated stamped type in the South Appalachian stamped pottery tradition, with approximately 750 unique designs identified and reconstructed by Bettye J. Broyles and Frankie Snow. The distinctive designs impressed on the vessels can be matched within and across sites to understand the movements, connections, symbolism, and artistic traditions the people who made them. SCCS researchers have been calling for a centralized database of design reconstructions to assist them in their work.

SV and WE are being developed at UofSC to assist SCCS research by expediting the design matching process and providing online access to SCCS design and sherd data. Launched in 2016, the idea for SV was formed after a conversation between researchers Karen Smith, who was with SCIAA at the time, and Scot Keith, then with New South Associates, Inc. UofSC faculty Colin Wilder, Associate Director of the Center for Digital Humanities and Song Wang, a Computer Science professor, joined Smith to create the SV development team. The SV team includes researchers and students in archaeology, information science, computer vision, digital humanities, and high-performance computing.

The SV project has secured almost $700,000 in grant funding since inception. This includes a $20,000 UofSC Provost Grant; $39,000 from the National Center for Preservation Technology and Training; $212,978 from the National Science Foundation (#1658987); $323,668 from the National Endowment for the Humanities (#HAA-266472); and a $99,934 UofSC Aspire II Grant (World Engraved, 2020). In this time, the team has accomplished development of the SV sherd-to-design matching algorithm and the creation of the WE database and website.

SV is a machine learning, computer vision algorithm that assists with SCCS design and sherd matching (Lu et al., 2022). The program is named after Frankie Snow in honor of his contributions to SCCS research. Using three-dimensional scans of sherds, SV extracts design curves by reading the depth of the impressions in the sherd and then matches those curves to reconstructed SCCS designs. Still being refined as of 2022, the SV team is working on aspects of sherd-to-sherd matching, design reconstruction, and RGB image splitting. Sherd-to-sherd matching will greatly expand matching capabilities by reducing the time usually required to sort through thousands of sherds looking for matches. Sherd-to-sherd matching can also be used to assist with reconstructing partial designs which can be finished by archaeologists to expand the SCCS design catalog. RGB image splitting is an important function that will streamline large-batch sherd submission.

WE is the online interface for SV submission and a public, digital archive of SCCS data. WE is named for Mark Williams and Daniel T. Elliott's edited

volume *A World Engraved: Archaeology of the Swift Creek Culture*. WE is the web portal for SV, allowing registered users to submit sherd data for matching. Users interact with their submitted sherds through a private user profile that allows them to edit and publish sherd data and review matching results. WE also acts as a digital repository of SCCS data gathered from multiple institutions across the southeast, liberating the information from lab silos. No account is needed to query published designs and sherds or to browse any of the supporting literature, such as scanning instructions or glossary. An account is required to submit sherds for SV matching and WE publication. All data submitted to WE for publication will be available for free to any person with an internet connection, and there is no charge for submitting sherds for SV processing. To ensure SV/WE is a useful research tool and digital archive, it must be built with user needs in mind.

At the time of user testing, WE contained 6 pages: Home, Search, Demo, Documentation, About, and User Profile. Search allows a user to query design or sherd data and contained 408 designs and 30 sherds. Demo displays a simple demonstration of how the SV algorithm works. Documentation contains any information that would assist a user in submitting or understanding data. This includes scanning instructions, a glossary of the terms used to describe the designs, metadata schemas for the design, sherd and site data tables, and a batch upload Excel template for large-volume sherd submission. About provides details about the SV team, news relevant to the project, and a contact form. The

User Profile is where users submit sherds, check matching results, and edit or publish submitted data.

The purpose of this thesis is to gain an understanding of the expected user community and to address information issues that have come up in the development of SV/WE. To meet this goal, a user needs study was developed for SV/WE. User needs studies are common in information science when creating or updating a database, archive, or other information system. Understanding users and their information needs can help to guide the development of the algorithm and website by resolving UX issues and including data or features that will encourage the use of SV/WE. User-driven submission allows for WE to include data from many scattered institutions but presents challenges to data accuracy and use rights. Knowing what data users have to submit and how they plan to use the data provided by others will assist the SV team in developing a system that meets their needs and encourages use in the SCCS research community.

Chapter 2: Background

Overview of Southeastern Paddle Stamped Pottery

Southeastern North America has long been recognized as an area of independent pottery invention. Early Stallings Island fiber-temper vessels were being developed and used from the piedmont to the coast of the Savannah River Basin around 4,500 years ago (Sassaman, 2002, p. 399-400). Sand tempered Thoms Creek wares were being produced soon after Stallings Island vessels were developed. Overall, these early hand-built vessels were large, rounded, and plain or utilized punctate decorative styles, including drag and jab punctate (Sassaman, 2002, p. 400). Tools such as reeds, sticks, periwinkle shells, and even fingernails, were pressed into the vessels to create a decorative effect, usually near the rim. By the end of the Late Archaic, sand-temper pottery replaced most fiber-temper and coil-building beings to replace hand-built vessels, but pottery use was still limited to a few regions in the southeast (Sassaman, 2002, p. 403-404).

Changes in pottery distribution, technique, and style mark the start of the Woodland period (1200 BCE – CE 1000) (Anderson & Sassaman, 2012). Sometime after 1000 BCE, pottery use expanded from a handful of regions and vessels were being made throughout the southeast (Anderson & Mainfort, 2002, p. 5). The huge variety in finish, paste, and vessel form of Woodland pottery has led to the archaeological definition of over 2000 types from this period alone

(Anderson & Mainfort, 2002, p. 2). Coil-built vessels are shaped by placing the coils into the desired form, then an anvil stone and a paddle are used to press the clay and seal the coils together (Shepard, 1956). This technique creates thinner vessel walls and transfers any texture or design present on the paddles to the exterior surface of the pottery. From the end of the Late Archaic through the Post-Contact period, Native American potters have used wooden paddles carved with lines or wrapped in cordage and fabrics to finish some vessels, leaving evidence of the paddle surface in the archaeological record. These stamped types, specifically those that utilized carved paddles with complex designs, display an incredible about of variation that can be used to explore stylistic changes over time, regional differences in technique, and connections between populations.

Early stamped vessels had parallel lines that were carved into wooden paddles, a technique called simple stamped. This stamping technique starts at the end of the Late Archaic and continues throughout the Woodland period (Williams & Thompson, 2014). Early types, such as Thoms Creek, Refuge, and Deptford Simple stamped show V-shaped or U-shaped grooves carved into the paddles that were lightly pressed onto the vessel exterior (Diachronic Research Foundation, 2015-2, 2015-3, 2015-4). Around 600 BCE vessels begin to show what is called check stamped, repeated perpendicular line carvings that create a grid-like pattern on the paddle and pottery (Diachronic Research Foundation, 2015-1).

Around 100 CE, people begin to create paddles with curvilinear carvings. This marks the beginning of the complicated stamping tradition and the SCCS type. Current literature suggests that SCCS likely started inland along the Ocmulgee or Chattahoochee Rivers. Sites such as Mandeville (9CY1), Swift Creek (9BI3), Halloca Creek (9CE4), and 1BR15 contain early Swift Creek components in sequence with earlier Cartersville and Ocmulgee Fields Check Stamp types, and the Walker Street site (9ME60) contains unusual Curvilinear-Check Stamped designs (Chase, 1998, p. 51). SCCS pottery spread from this region across many areas of the Woodland southeast, and has been separated into Early, Middle, and Late phases to delineate approximately 750 years of use and major stylistic changes. All phases of SCCS pottery are abundant archaeologically across all of Georgia and the Gulf Coast of Florida (Figure 1). The curvilinear style spread into other regions and was replicated on vessels of different temper and forms including the Santa-Rosa Swift Creek type in the Florida panhandle, the Pickwick type in Tennessee, and the Mann type in Indiana, demonstrating the incredible range of the Swift Creek influence (Chase, 1998, p. 50, 55-56; Elliott, 1998, p. 21; Smith, 1998, p. 112).

SCCS demonstrates a higher level of uniqueness in designs than other types of complicated stamped pottery. Curvilinear motifs are incorporated into complicated stamped traditions during the Mississippian period but are simpler. Designs used in stamping show some regional differences and are usually repeated designs with small changes (Anderson, 1994, p. 363-364). The

uniqueness of SCCS has made it a focus of archaeologists since the earliest antiquitarian expeditions.

Early Swift Creek Research

Charles C. Jones, William Henry Holmes, and Clarence Bloomfield Moore highlighted SCCS sherds in their manuscripts long before the formal type was defined. In 1873, Charles C. Jones, Jr. published the volume *Antiquities of the Southern Indians, Particularly of the Georgia Tribes* that contained his observations of artifacts that he found while living in the state (Jones & Schnell, 1999, p. ix). This early volume on artifacts from Georgia became part of the foundation of SCCS research in the mid-20th century and was reprinted with edits by Frank Schnell in 1999 (p. x). William Henry Holmes' *Aboriginal Pottery of the Eastern United States* was published through the Smithsonian Institution in 1903. Holmes' exploration of Native American mounds in the southeast is recounted in the text, accompanied by sketches and photographs of vessels, figures, and human remains. Several ceramic types are represented in the volume, including several vessels that display SCCS and other kinds of complicated stamped designs. Because Holmes' volume is an older government publication not under any copyright, it has been digitally scanned and uploaded to multiple online locations including the Internet Archive and the Biodiversity Heritage Library.

Clarence Bloomfield Moore spent the early decades of the 20th century excavating and publishing his findings at sites across the southeast. Moore excavated mounds looking for elaborate funerary items, specifically focusing on ceramics (1999, p. 3-5). Moore produced several reports over two decades of publication, including five volumes on his expeditions in northwest Florida and

the adjacent parts of Georgia and Alabama. Those five reports were reprinted in a single volume edited by David S. Brose and Nancy M. White and published in 1999. Moore's documents contain photos and sketches of dozens of types and forms of vessels, effigies, and tools, including several sherds and a minority of whole vessels that are now assigned to the SCCS type.

The historic works of Jones, Holmes, and Moore contain a great deal of imagery and heavily influenced mid-20th century SCCS research. However, their reports and notes lack the contextual information required for modern archaeological study. Further, racist language, the perpetuation of racial biases common in the period, and acknowledgement that this early focus on burials is considered grave looting by modern archaeological standards makes the study and use of this literature problematic. However, since this literature has been available to researchers and the public through both print and digital media for decades, it will always be available for anyone who seeks it.

The WPA and RBS eras of American archaeology heavily influenced the development of SCCS Research. The SCCS type was first formally defined by Jesse Jennings and Charles Fairbanks in 1939 based on Arthur Kelly's work at the Swift Creek (9BI1) site (Kelly, 1938). Jennings and Fairbanks (1939, p. 1) highlight the unique curvilinear stamped designs, identify the production method as coil-built with sand or grit temper, and recognize it as the earliest complicated stamp type with three distinct phases. Archaeologists leading WPA projects across the southeast encountered these unique designs at the sites they excavated. Arthur Kelly found SCCS during excavations at Macon, Georgia;

Gordon Willey identified the type in Northwestern Florida; and Thomas Lewis and Madeline Kneberg recognized the designs at several sites in Tennessee on vessels with limestone temper (Kelly & Smith, 1975; Willey, 1949; Lewis & Kneberg, 1946). WPA excavations employed large crews under just a few trained archaeologists, and some excavations in Georgia utilized black women's labor despite political opposition that intended to prioritize the recovery and support of white Georgians (Marsh, 1998, p. 13-16). The size of the crews enabled excavations on a massive scale that are impossible to replicate today and allowed for the collection of enormous amounts of data.

Later RBS work continued to expose the range of distribution and variation of SCCS across the southeast. Two sites that were the focus of excavation have been particularly influential to SCCS design research overall: Fairchilds Landing (9SE14) and Kolomoki (9ER1). Joseph R. Caldwell excavated the sites Fairchilds Landing and Hares Landing (9SE33) circa 1953 through the National Park Service River Basin Salvage Program to mitigate the loss of these sites due to the creation of the Jim Woodruff Dam. Caldwell worked on the report for these sites until his death in 1973, and it was finished by Betty A. Smith in 1978. The report contains more than 100 design reconstructions based on sherds found at the sites, but the name of the artist who drew them was not recorded (Caldwell & Smith, 1978). Many of the "Unknown Artist" designs are inaccurate reconstructions, and it seems the artist struggled to isolate instances of design overstamping and therefore connected repeated elements.

Smith acknowledged that edits were made to the report in sequencing and sentence structure but not Caldwell's overall meaning, and her finalized report remained unpublished and uncirculated outside of a handful of researchers (Caldwell & Smith, p. i; Caldwell et al., 2014, p. ii). In 2014, Mark Williams, Karen Smith, Shawn Johns, and Kelly Brown published an edited version of Caldwell's report through the UGA Laboratory of Archaeology Series. The report by Caldwell et al. (2014) contains more concise editing of Caldwell's original document, as well as additional design reconstruction images and drafts.

Limited work had been done at Kolomoki, also known as Mercer Mounds, until William H. Sears lead extensive excavations at the mound complex. Sears came to Georgia in 1948 at the request of Arthur R. Kelly and the Georgia Department of State Parks to investigate a small part of the Kolomoki site that was going to be destroyed during the building of a new road and dam on Kolomoki Creek (Sears et al. 2013, p. 2). Kelly recognized the potential of the state-owned site to generate public interest and funding for Georgia archaeology, and Sears' work expanded past the small mitigation site as he attempted to solve the puzzles of the Kolomoki mound complex for his dissertation work (Sears et al., 2013, p. 8-9). However, Sears produced a chronology for SCCS from the Kolomoki data that was reversed from the chronology that Caldwell produced from the Fairchilds Landing data. The dispute was not ended until decades later when Sears acknowledged that he misinterpreted the ceramic sequence due to a lack of stratigraphic data at Kolomoki (Sears, 1992).

The WPA and RBS eras of archaeology provided large amounts of data that is still used in SCCS research today. Review of site reports from these eras demonstrate that SCCS is found in all kinds of contexts: Village sites, middens, and burial mounds. Collection of grave goods and ancestors remained common throughout these periods of archaeological study, and in 1950 a burial mound at Kolomoki was opened as a museum exhibit for several decades (Pluckhahn, 2002, p. 65). Changes in archaeological ethics since the passing of NAGPRA should be considered by researchers when using and publishing legacy data from burial contexts that are protected during modern excavation work.

Swift Cree Paddle Design Reconstructions

The paddle designs reconstructed by Bettye J. Broyles and Frankie Snow are the key to most modern SCCS research and the SV project. Broyles published more than 80 images of design reconstructions in 1968. Her design work focused on known sites in Tennessee and Georgia that were excavated before 1970 (Broyles, 1968). The bulk of the designs come from Kolomoki, Fairchilds Landing, Quartermaster (9CE42), Mandeville (9CY1), Swift Creek (9BI3), and Milamo (9WL1). Broyles held hundreds more unfinished and unpublished design drafts and estimated that she had more than 600 SCCS individual designs, but only approximately 375 individual complete and partial paddle design reconstructions have been isolated from scanned data provided by UGA (Broyles et al., 1994, p. 26). The designs that Broyles created from Fairchilds Landing sherds are a great improvement over the designs created by

the unknown Fairchilds Landing artists and demonstrate that a significant amount of artistic skill is required to reliably reconstruct paddle designs.

Broyles assigned her own design ID numbers to track many of the designs, but never recorded her methods for designating these IDs. The Caldwell et al. (2014) report contains a table that ties Broyles Roman numeral design IDs to the design IDs used in the Caldwell reports, but many gaps remain when tracing her design reconstructions to the sherds that were used to produce the design. Since Broyles passed in 2011 and her original notes and designs were lost, our understanding of her organization system is unlikely to improve, and important contextual information cannot be recovered.

Snow's design reconstruction work has focused on central Georgia, particularly the Ocmulgee Big Bend region. Snow's design recreations are based on ceramic sherd data collected he collected across Georgia in the 1970s and 1980s or private collections reported to him within Georgia and Florida (Snow, 2007). Snow has published only a handful of designs (Snow 1977, Snow 1998; Snow & Stephenson, 1998) but allows SCCS researchers to access and use his full design catalog. Snow's (2007) unpublished design catalog contains 402 individual complete and partial designs.

While Snow assigned the designs an ID number in the 2007 document, prior to this designs did not have IDs and were known by names that described the images. Most work done with Snow's designs lacks the consistent, traceable design IDs needed to track them across manuscripts. Reports by people using Snow's reconstructions were often published without printing the designs,

presumably to prevent unauthorized use. Extensive searching of the DINAA has shown that many of Snow's sites had not been submitted to the Georgia Site Files at the time of DINAA data ingest (Open Context, n.d.). The work that Snow has done has been vital to modern SCCS research, but most of his data and designs remain unpublished and is at risk of being lost or hidden from the public.

Recent Swift Creek Research

Modern archaeologists study SCCS sherds and designs to understand aspects of movement, connections, and symbolism of the people who made and used the vessels centuries ago. Mark Williams and Daniel T. Elliot's (1998) edited volume, *A World Engraved: Archaeology of the Swift Creek Culture* brings together works by numerous other SCCS researchers. Chapters discuss the history and range of SCCS and provide analysis of designs at and across specific sites to explore connections between and the organization of the people who created the pottery.

In their studies of stylistic variability in SCCS paddle art, Karen Y. Smith and Vernon J. Knight Jr. (2012; 2014; 2016) classified the design elements in SCCS, discuss aspects of style in the creation of designs, and see a motivation for uniqueness that drives artistic creativity in ways not seen in regional paddle stamping technology before or after. Thomas J. Pluckhahn (2007) continued work at Kolomoki to explore symmetry in SCCS paddle designs and identified assemblage level variation and broader social processes. Research efforts led by Neil J. Wallis (2011) use instrumental neutron activation analysis and petrographic analysis to trace the exchange of SCCS vessels. A. Martin Byers

discusses SCCS within the context of connections between regional ceremonial spheres in his volume on Hopewellian assemblages in the Ohio region (2015). SCCS ceramic research is a vibrant and active area of archaeological research that would benefit from the development of SV/WE.

The UF Archaeology and Ceramic Technology Lab maintains a public database of SCCS vessels, sherds, and designs that come primarily from the work of Pluckhahn and Wallis. It is unclear from the website information when the database was created and last updated (University of Florida, 2022). Many entries have only two or three basic descriptive fields filled in, and some are missing images for the records. The data that was ingested does not appear to have been checked for typographical errors or standardized. If searching by location, five separate spellings for the Fairchilds Landing/Hares Landing site are listed. Some limited designs have been drawn from the sherds in the database, but they are simple sketches of what the design looks like on a single sherd and do not attempt to fill in the missing parts. (University of Florida, n.d.). While the UF database is a great first step towards a public digital archive and focused on SCCS, the database is vastly different from SV/WE's user driven submission, robust data collection for entries, and matching algorithms.

Data Synthesis and Public Archaeology

Synthesis of archaeological data may present challenges but is vital for the research goals of many archaeologists. Large scale data synthesis in archaeology can liberate archaeological interpretations from the level of the individual project, allowing researchers access to data from multiple locations to

produce large-scale understandings of the past (Altschul et al., 2018). SV/WE builds on this idea of synthesis to provide access to standardized SCCS archaeological data from labs across the southeast.

A goal of WE is for the data held in the archive to be compatible with the DINAA, so that WE data may be synthesized with other archaeological data in the future (K. Smith, personal communication, February 13, 2019). DINAA integrates governmental data relating to archaeological sites through eastern North America into a public digital database (Wells et al., 2014). The integrated data that DINAA provides has been used by archaeologists to investigate issues such as destruction of archaeological sites due to sea-level rise (Anderson et al., 2017) and how DINAA can help to preserve archaeological data in an uncertain political future (Kansa et al., 2018).

Opening SV/WE to the public is an exciting prospect for an archaeological database. Charles R. McGimsey (1972) frames public involvement in archaeology as a service owed and a necessary endeavor for a new public archaeology. Lynne Sebastian (2009) argues that since approaches to archaeology and cultural resource management must consider both the irreplaceability of the record and public money spent on management of the record, projects should aim for both good archaeology and good public policy. Collaboration with interested parties, such as Native Nations and the general public, should be encouraged when building digital collections to meet diverse user needs and address the ethical requirements of publicly funded archaeology.

Archiving Native American Materials

The overwhelming majority of archaeological work on America's pre-contact sites has been undertaken without consideration of or collaboration with descendent Native Nations. Today, professional organizations including the Society for American Archaeology (1996), the American Anthropological Association (1998), and the Society of American Archivists (2020) ethical codes include provisions for members to respect diversity, avoid harm to studied groups, act as responsible stewards of information, and to collaborate and share knowledge with the populations that are being studied, their descendants, or other interested public groups. Including provisions for ethical data management and community collaboration are important first steps, but these codes are mere guidelines encouraging action and lack practical paths to help researchers accomplish these goals.

The *Protocols for Native American Archival Materials* were published in 2007 by the First Archivists Circle to outline best practices for culturally responsive care for materials held by non-tribal entities. The First Archivists Circle was comprised of Native and non-Native information professionals, historic preservation officers, curators, and anthropological professors who drew from various professional codes of ethics and the *Aboriginal and Torres Strait Islander Protocols for Libraries, Archives, and Information Services* to create the protocols (2007). The protocols provide detailed guidelines for archival institutions and Native American communities to improve collections, accessibility, and bring awareness of special archival needs for cultural materials. Building Relationships of Mutual Respect is the first step in the protocols. Relationship building between

communities provides a base for meaningful consultation, ensures respectful care of archival materials, and encourages dialog and cooperation to address mutually beneficial solutions to problems (First Archivists Circle, 2007).

Anthropologists, archaeologist, and archivists have started the work needed to incorporate descendant communities and the public in their research. Digitization has changed how data are collected, stored, and distributed, but archival measures often overlook alternate histories. Trish Luker (2017) and Melanie Delva (2018) address ways that colonialism impacts archival practices, materials, and relationships with indigenous communities, suggesting that non-indigenous researchers incorporate indigenous perspectives to decolonize archives and create richer archives.

Collaboration is accomplished by researchers actively listening to communities and implementing community perspectives into studies and curation. Gardiner et al. (2011) show how collaboration led to a digital archive that benefits all users by giving the communities access to research built on their intellectual property while assuring researchers that their data are being properly curated and reused. Mary Wise and Sarah R. Kostelecky (2018) report that researcher's collaboration with the Zuni Pueblo dramatically improved many aspects of a Zuni language digital collection. In both cases, collaboration led to richer digital archives that benefit more than just researchers.

Needs Assessment Studies

Understanding the needs of users is critical to building a successful digital collection. Alexandra Mills (2015) argues that building digital collections relevant

to users can only be accomplished by making users part of digitization initiatives. Needs assessment studies are one way of including users in digitization projects. Harriett E. Green and Angela Courtney (2015) conducted a mixed-methods needs assessment of humanities scholars and identified interoperability and data curation as two key needs. A system-specific user assessment study at the University of Houston Digital Library sought to understand key stakeholder requirements and identify areas for future initiatives that could be implemented in new phases of work (Wu, Thompson, Vacek, Watkins, and Weidner, 2018). A survey developed for a user engagement study of Emblematica Online lead to a deeper understanding of how people used the database and strategies to increase usability of that digital collection (Green & Lampron, 2017). Understanding user needs provides a framework for the creation and maintenance of digital collections.

Snowvision Publications, Presentations, and Outreach

Several members of the SV team have published articles about the project. Wilder et al. (2020) is a review of the Snowvision project and findings to that date. Jun Zhou and Yuhang Lu have written and presented extensively about the matching algorithm focusing on curve-pattern matching and segmentation, design identification and clustering, and science gateways for data accumulation, processing, and dissemination (Zhou et al, 2017; Lu et al., 2018; Zhou et al., 2019; Zhou et al., 2020; Lu et al., 2022). As the matching algorithm is refined and expanded, the SV team will continue to focus on publication to promote our novel methods.

Public dissemination and outreach have also been a focus for the SV team. Lu (2020) has released the project code publicly through GitHub to fulfill NSF grant requirements. A blog post was created for Tennessee Archaeology Day about SCCS pottery scanned for the project from the Pinson Mounds (Smith, Keith, & Blackmon, 2019). SV team members Sam McDorman and Deja Scott presented project research at the virtual Discover UofSC 2021 event (McDorman, 2021; Office of Research, 2021). While the Snowvision project is focused on the needs of SCCS researchers, the SV team is attempting to bring the project into a more public view.

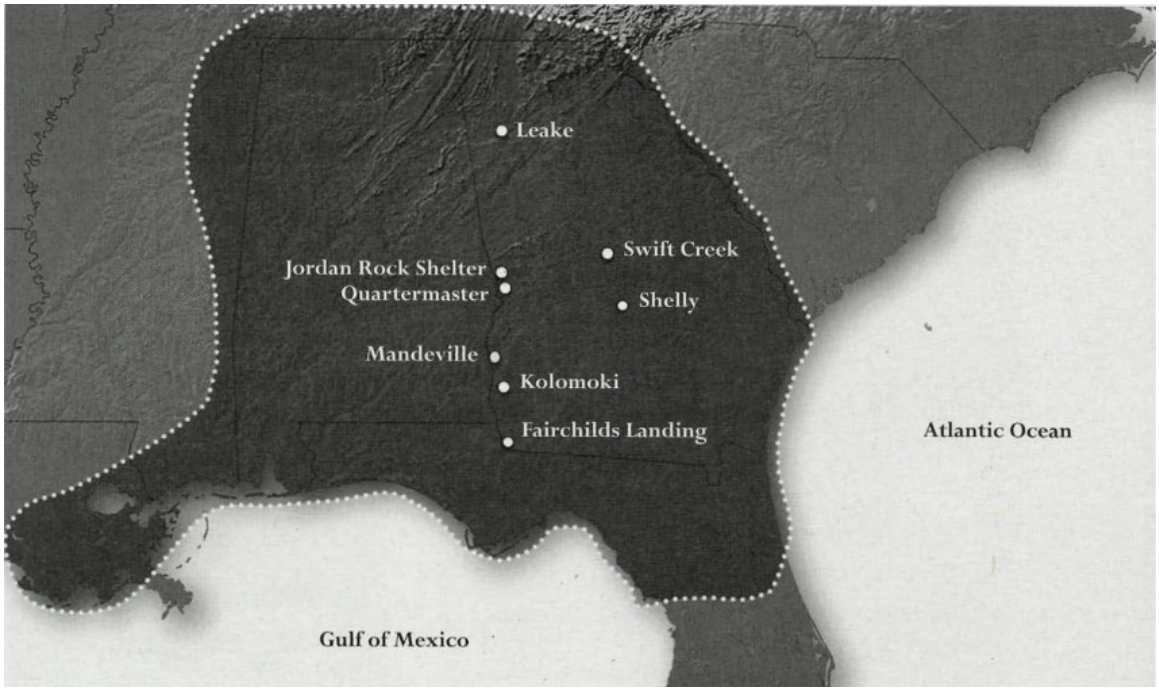

Figure 2.1: Distribution of SCCS pottery (from Smith & Knight, 2012).

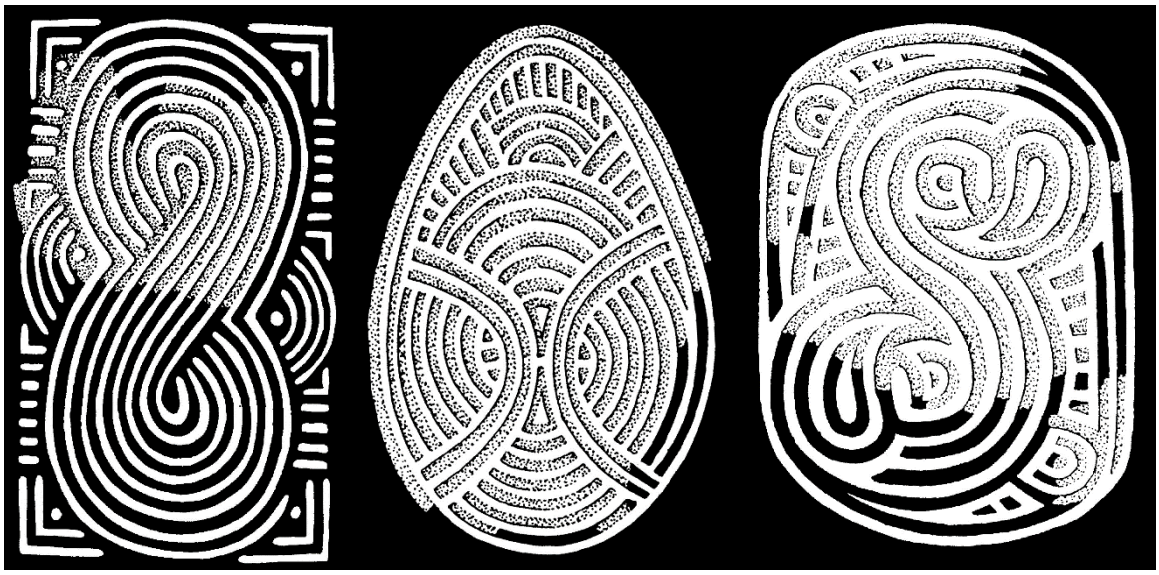

Figure 2.2: Selection of SCCS designs reconstructed by Bettye Broyles. BBP02-4, BBP08-3, & BBP14-4 from the Fairchilds Landing (9SE14) site (Broyles, 1968).

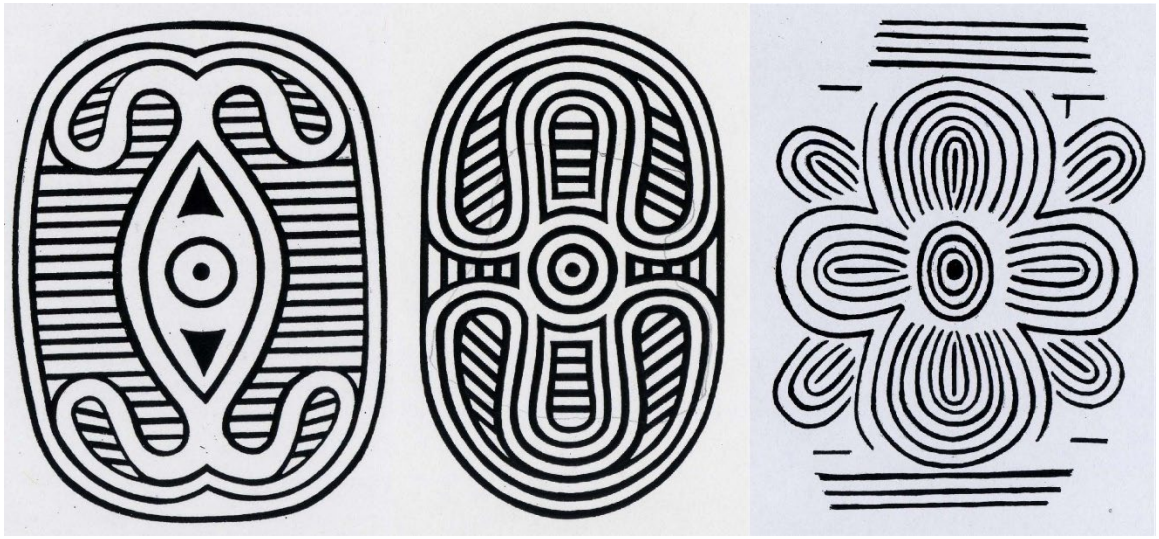

Figure 2.3: Selection of SCCS designs reconstructed by Frankie Snow. FS104, FS117, & FS161 from the Hartford (9PU1) site (Snow, 2007).

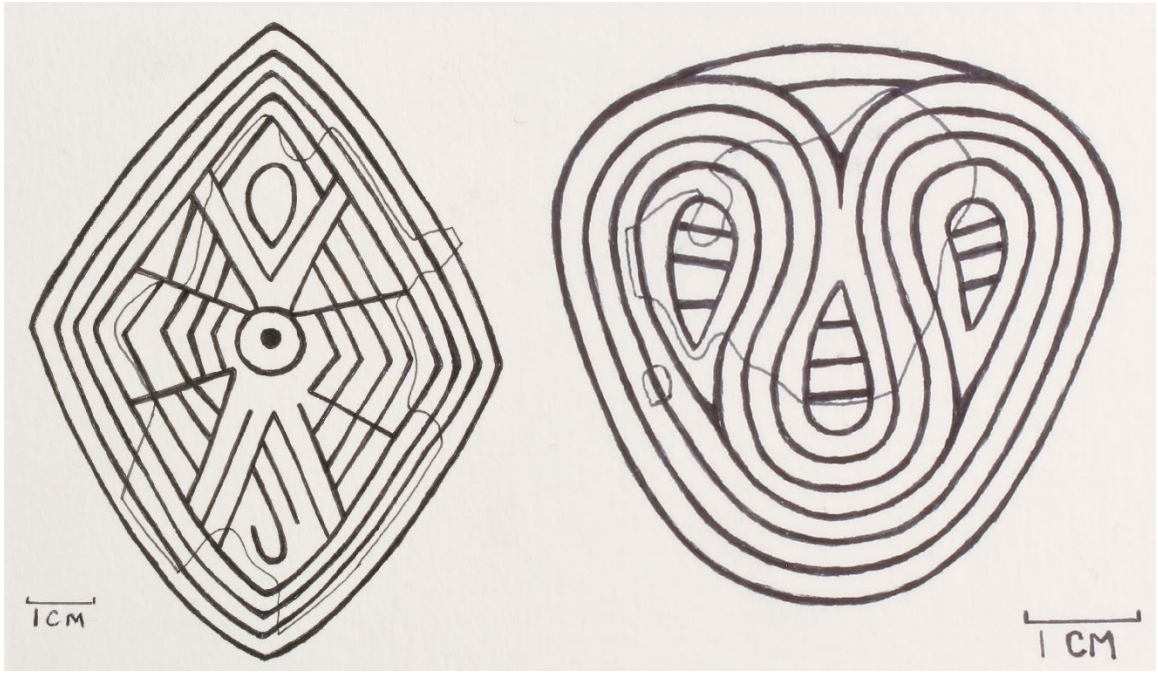

Figure 2.4: Selection of SCCS designs reconstructed by Sam McDorman. (STM003, STM005) from Sandy Hammock (9PU10) and Pickens County, South Carolina (McDorman, 2022-b, -d).

Figure 2.5: Selection of Mississippian design reconstructions. BBP19-3 and BBP20-1 from 9CL51 (Broyles, 1962). STM002 and STM004 from 38KE12 (McDorman 2022-a, -c).

Figure 2.6: Figure 6: Selection of ceramic sherds used to reconstruct STM003. Sherds show heavy overstamping, or repeated impressions of the paddle that obscure earlier impressions. Photo by Sam McDorman. Sherds from Sandy Hammock (9PU10), courtesy of Keith Stephenson.

Chapter 3: Methods

User needs studies are routinely accomplished using a mixed method study design that utilize qualitative and quantitative research strategies and digital collections benefit from this collaboration between developers and user communities. Primary user groups are expected to be researchers, archaeologists, curators, artisans, educators, and students from the public and descendant communities such as the Muscogee (Creek) Nation, The Cherokee Nation, The Eastern Band of Cherokee Indians, and The United Ketoowah Band. No one under the age of 18 was allowed to participate in the study. Participation in the project was completely voluntary and consent could be revoked by participants at any time for any reason without penalty. There are no expected risks to survey or interview participants other than those encountered in everyday life. Both parts of the user testing went through separate IRB review through UofSC. The survey was approved in September 2019 (Pro00088441) and the interviews were approved in October of 2020 (Pro00093577).

Recruitment for the user needs study was conducted among academic researchers and THPOs for the Native Nations listed above. A list of SCCS researchers and THPO contacts was compiled through Google searching. Emails were sent to these contacts explaining the SV/WE project, the goals of the user needs study, and a link to the survey. Information sent to the contacts was reviewed by committee members Karen Smith and Courtney Lewis. The emails

encouraged the contacted person to recruit other people who would be interested about the study. Using snowball recruiting instead of randomization limits broader interpretation and implication of the study but is necessary to gather feedback specific to our data and algorithm. The identities of the survey participants were protected by limiting the collection of identifying information.

The survey was built using Qualtrics and was open from November 2019 through March 2020. The purpose of the survey was to gather data about user demographics and information practices to gain a base understanding of expected user needs and to develop an interview guide for user testing. Survey respondents were provided with a confidentiality and consent statement at the start of the survey, and completion of the survey was considered consent to participate in the first stage of the user needs study. Survey questions covered three primary areas: limited demographics such as profession, years of archaeological experience, and research interests; information behavior concerning their own data or accessing data held in institutions or other databases; and questions specific to SV/WE, including ideal website and database use, descriptions of data they have available for submission, and concerns that could hinder the usefulness of SV/WE.

A user testing interview guide was developed from the survey results for the second stage of the user needs study. User testing was conducted in November and December 2020. Only survey respondents who indicated they were interested in participating in user testing were contacted about this phase of the study. Interview participants were given a consent form to complete and

return before their scheduled interview. Anonymity was protected by removing any identifying information in the data used in this thesis, but respondents may be able to recognize their answers or the answers of respondents known to them. While protecting anonymity is an important cornerstone of human-based research, respondents should be given credit for their participation. Therefore, user testing respondents were asked if they would like to be thanked by name in the acknowledgements for their participation.

A $350 honorarium was offered to interview participants for their time. This honorarium was not part of the original thesis proposal or design, and only came about after reallocation of funds due to the COVID-19 pandemic. The NEH grant originally planned for a conference that would bring researchers to Columbia, South Carolina to discuss SV/WE. Because of the pandemic, the conference was held virtually in June 2020 and so the travel funds set aside were not needed. When preparing the interview guide and IRB in the fall of 2020, a decision was made to repurpose some of that unused travel money for the honorariums offered to participants.

The purpose of the second phase of the user needs study was to gain a deeper understanding of user needs that refined several aspects of the website and database. Interviews allowed for direct testing of the SV submission process and the WE website functionality and display. Interviews were also used to gather detailed feedback for the management of information in the database. Interviews were done individually through Zoom to accommodate COVID-19 restrictions and large distances between myself and interview participants.

Interviews were audio and video recorded through the Zoom app and broken into three sections: Design testing to refine the display of design reconstructions and the data provided with them; Sherd testing to refine the collection, display, submission, and matching results of sherds and the data associated with them; and general open-ended questions about how SV/WE would benefit the participant in research and outreach, the data they work with and have for submission, policies for data sharing and use, willingness to collaborate with stakeholder Native Nations, and the handling of sensitive burial data.

Transcription was begun by hand but proved too time consuming, so MP3 files were uploaded to Otter AI. Otter AI provided basic transcription that required heavy editing for accuracy. Due to privacy concerns, permission was not given to Otter AI to use the submitted MP3 files and user edits to refine their transcription services. Transcriptions were coded by hand.

Chapter 4: Analysis

Results of Survey

The survey was open from November 2019 through March 2020. Twenty-seven surveys were started but only sixteen finished responses were recorded. Results were downloaded directly from Qualtrics in Excel format and answers to open-ended questions were coded by the author. Survey questions are listed in Appendix A.

No survey respondents appeared to be affiliated with the Native Nations that were contacted about the survey. Review of the selected contacts and other SCDNR consultation work since then has revealed that the people identified as THPOs during the survey planning process may have been outdated contacts. Lists of THPO contacts made by different agencies may have several discrepancies of names, emails, and phone numbers for the same group making it difficult to identify the proper point of contact. The contacts would have been reviewed and recontacted if not for the COVID-19 pandemic and subsequent closures and uncertainty when a decision was made to close the survey and move forward with restructuring the second half of data collection with the pandemic in mind. While the Native Nations contacted were not able to be included in this thesis project, the SCDNR has been able to make the proper contacts on this project and others in the years since. This will allow us to include the Native Nations more directly for any future SV/WE user testing and planning

projects, so that we can gather feedback and provide data in ways that benefit their communities.

User Profile

All respondents were archaeologists who described their work as curatorial (n=6), educational (n=8), or research (n=7). Most respondents had worked with stamped ceramics for less than 5 years (n=5) or more than 21 years (n=7). Research interests cross all periods of stamped ceramic production in the southeastern United States from Late Archaic simple stamp through post-contact period stamped Colono-Indian wares. Participants are interacting with complicated stamped ceramics in all kinds of archaeological activities: Excavation (n=14), curation (n=12), research (n=12), vessel reconstruction (n=9), and design reconstruction (n=6).

Expected Use

Respondents expect to primarily use SV/WE to expand movement and connections research on populations that utilized paddle stamping technology in the Southeastern US. SVWE would be used to visualize design matches across time and space, understand inter-site and intra-site matches as proxies for social interaction, or to understand broad-scale communities of ceramic practice and regional exchange patterns. Users expect to use the WE digital archive as a central design database that links to site and bibliographic information and help researchers and students with identification when cataloging stamped types.

Respondents anticipate that the matching algorithm and database of designs will increase efficiency in design research and matching. A central

database will make searching reconstructed designs much easier, and algorithmic matching using data from multiple labs will turn a once challenging and laborious process much simpler, quicker, and reduce travel and labor costs. Scanning and data entry can be accomplished by graduate and undergraduate students, providing opportunities for student training outside of more traditional field and laboratory roles.

Respondents see the potential to expand collaboration using SV/WE digital resources. Collaboration was used by respondents to describe two kinds of data exchanges: Exchange with researchers and exchange with descendent Native Nations. These groups are not mutually exclusive and are expected to have overlapping user needs, but they were discussed as separately by respondents. Respondents see WE as a central location to access and promote their digital sherd data and a network for identifying other institutions and researchers with design matches or similar collections. WE can also act as a platform for consultation with Native Nations who have an interest in paddle stamped pottery and to facilitate descendent community input at all levels of complicated stamped research.

SCCS is only one type of stamped ceramic, and most respondents research interest expand into other types of complicated and check stamped ceramics. Respondents were primarily interested in the inclusion of Mississippian complicated stamped types but check stamp paddle matching was also requested. One respondent questioned the utility of limiting the SVWE to just

SCCS but acknowledged that encompassing all kinds of stamped pottery would be a huge task.

Data Submission and Reuse

Survey results show that 81% of respondents (n=13) are interested in submitting sherd data and 56% (n=9) are interested in submitting paddle design reconstructions to SV/WE. Most indicated that they have hundreds or thousands of sherds for matching and possible submission. Most respondents (n=13) report that their sherd data comes from archaeological excavation or survey, with a minority (n=3) from private donors or collections. Respondents with access to 3-dimensional scanners (n=10) all reported using machines made by the now-defunct NextEngine company. Overwhelmingly, respondents are willing to watch instructional videos on SV/WE scanning and data ingest procedures (n=15). Most respondents (n=10) said they are willing to wait more than a month for SV matching results and all showed an interest in being able to access the 3D scans submitted to SV.

Data access and reuse were major concerns for respondents. Only 30% (n=4) said they would expect restrictions for access or use on the sherd data they submitted. Restrictions included clear credit to the institution that houses the data when viewed on WE and proper citation and credit when data is reused. One respondent shared their opinion that SV/WE would only work with a fully open Creative Commons license. However, another respondent mentioned that they hold collections they do not own and so they may not be able to allow fully open use of submitted data.

Control over data submitted to SV was another concern. One respondent suggested temporary data embargoes or publication first rights agreements to allow submitting institutions time to publish on any results they receive from SV. Two respondents mentioned difficulty in getting other researchers to share their data. One suggested simply ignoring those researchers with a tendency to hoard data, while another suggested focusing on scanning surviving legacy data controlled by institutions, not individuals, to populate the WE archive.

Other Concerns

The reliability of the matching algorithm was a concern, as well as how to handle legacy sherds with little or no contextual information. Cost was mentioned as a potential issue, although the single respondent who mentioned this did not specify if they were concerned about cost to use the algorithm or cost related to scanning sherds. Two respondents mentioned concerns they expected from descendent Native Nations. One respondent stated that they would work with Tribal entities to determine if they felt comfortable with images of artifacts being publicly shared, and another highlighted that use of artifacts associated with ancestor burials would be objected to by the federally recognized Native Nations they work with.

Results of User Testing Interviews

Fifteen survey respondents said “yes” or “maybe” to participating in user testing interviews. Seven respondents were contacted about participating in the user testing and five participated between November and December 2020. All participants were archaeologists with PhDs working in museum curation or as

professors at universities. While all worked directly with stamped ceramics, only four had backgrounds in stamped ceramic research. Funds from the NEH grant were used to give each participant a $350 honorarium for their time. Interviews took about an hour and a half with the longest being a little over two hours.

Due to the COVID-19 pandemic, user testing was done remotely through Zoom. Participants were invited to private Zoom meeting rooms and shared their screens during the testing portions of the interviews. All interviews were audio and video recorded through the Zoom app.

User testing was broken into three sections: Design testing, sherd testing, and an interview portion. A single participant had access to a 3D scanner and was able to test the batch submission template and portal. Design and sherd detail testing were used to check the adequacy of the data provided and the ease of WE search, browsing, and submission. The interview portion provided deeper insight into expected uses and concerns participants had for SV/WE. The interview guide can be reviewed in Appendix B. Since the sherd and design pages have overlapping UX and functionality, they are discussed together in the analysis below unless one is specified.

Design and Sherd Query

All users had difficulty entering search terms on the design query section of WE. Testing required participants to select multiple design elements in a single search, but the process to accomplish this had to be explained for each participant. You could not select or deselect multiple terms from the list. Each design element term had to be found in a list and selected individually. To select

another, the user had to backspace the characters in the field and then select the next term. If the X next to the term was used, it would clear the term from the search. Participants stated that this issue was “confusing” or “odd” and that they would not have been able to enter multiple terms without assistance. Even with assistance, a single participant was unable to search multiple terms and the task was not completed.

Participants were asked how the query function could be refined, and specifically if any additional search terms would be useful to them. One user questioned the kind of search being run, noting that it was unclear if an “and” or an “or” Boolean search operation was being used. Another participant noted that filtering by publication would make tracking designs in those publications easier for researchers using that literature:

> Some people might be interested in seeing all of the designs associated with a specific publication. … they have the publication in front of them and they’re trying to track down where each of those are in terms of your Design ID numbers.

Spatial level design query was discussed by one participant, who mentioned that people may not know specific site names and numbers but would be interested in county or state level searching to narrow their results.

Sherd Query was focused on three sherd characteristics: Location, ceramic features, and design elements present. Multiple participants felt county and state searching would be useful when considering the spatial distribution of sherds and designs. Being able to sort by familiar ceramic categories such as

temper was discussed by three participants. Filtering by ceramic type was brought up by a participant in the context of expansion who stated:

> Sherd type or ceramic type. … once you expand then it can be anything. Then it would be really important to narrow down what I'd be searching through.

The same participant also stated:

> As you broaden it, knowing who excavated it. But that information is kind of detailed. So it would only be relevant more if I was like working on a site that I knew Joseph Caldwell worked on, and would want to see the information associated with them.

Sites frequently have multiple people doing work over several decades, and this search function would allow users to filter through multiple projects at one site.

Overall, the most requested Sherd Query function was the ability to filter using design information. Design ID for matched sherds is an obvious filtering option, but four of the five participants requested being able to search for Elements found on sherds themselves. Participants felt motifs would be a “main thing” they would want to filter sherds by, and one stated:

> If you’re looking for all the figure 8s it would be nice to have all the sherds with figure 8s returned. That’s a massive return probably, you know once you get more and more in, but I think that’s what most people would want.

Filtering sherds by Element was always discussed in combination with spatial searching, demonstrating the need for a dynamic search that can be easily customized.

Query Results Display

Participants were asked about the clarity of results and the ease of navigating through them. At the time, WE defaulted to show just 6 results on a page. All users found this number to be too low and requested seeing more results after querying. Two participants felt it would be useful to display what terms were searched at the top of the results, since after reviewing 75+ designs they could not remember what they had searched for or how it related to the individual results that were returned.

Participants were pleased with the map displayed next to the results and appreciated being able to quickly see a site location, but felt the map needed some work. The icon at the time of testing was a cluster of three small sherds, but all users were unsure of what the icon image represented and several wondered if it was supposed to represent a cluster or an individual record. Several participants requested getting information from the icons if they hovered over them with the mouse, but what information should be provided varied. Most agreed on at least displaying the site name and site ID, while others felt displaying the number of sherds or designs associated with the site would be useful. Another participant stated that the mismatch between the number of returned results and the number of icons on the map was confusing:

> I'm just trying to figure out if the map is showing me all of them [the location of the query results] at the same time or if I have to like scroll through, you know because at the beginning it was showing me 25 but it looks like the map is showing all 75.

Participants felt the map didn't zoom in quite enough, and one participant wondered if it would be possible to download the spatial information from the map into an Excel file.

Design and Sherd Detail Pages

Participants were asked to review the information on and layout of the Design Detail page, and specifically what information found there would be most important for their work. All participants requested that the location a design was found at be listed on the design detail page. At the time of testing, the design locations would populate on the map after the design query, but the locations and map were not on the design detail page. One participant stated why this missing information is an issue:

> It could be useful to have a field in here that has the list of sites that this design is found at. I think that would be I would imagine that most people will be interested in that information if they're searching for design.

Another participant highlights why the information is important when asked what they feel is missing from the design detail page:

> Yeah, where's it [design location]? Where else where do you see it? I mean, if it's at a site just up the river eight miles, then yeah,

> duh of course. But if it's 260 miles away, across Georgia… I'd love to know that.

Participants felt that the most important information on the design detail page were the descriptors such as elements or design ID and the design reference. They stated that this information would be most useful in identifying design matches in their collections or when publishing data they submitted for matching.

Two conflicting opinions were collected about the fields listed on the design detail page. The fields listed are not common across SCCS research and were compiled during the development of the WE database and website. Participants were therefore not familiar with the types of elements and symmetries or the WE specific terms such as "completeness" or "guide points." One participant felt that having a roll over function would help users understand the specialized terminology used:

> You had to explain to me what completeness meant. Now if there was a rollover that kind of gave that explanation for completeness, framing, guide points, line filler, you know quite a few of these are not immediately recognizable by a lot of users. So a rollover on this would be probably pretty useful or at least you know, a little help button. An info button.

When asked if including field descriptions would be useful on the design detail page, another participant felt that including the information would be redundant:

> I don't think so. I think as long as it [field descriptions] was in the how to use this site information. Because presumably most folks

> aren't going to look at a single one in isolation, they're going to be thinking in terms of broader research, so they'd be looking at those other info pages beforehand.

These comments demonstrate a need to clearly define any terminology used in SV/WE.

Single Sherd Submission

All participants were asked to test the online single sherd submission portal on the WE website by submitting data for a single sherd. All participants used the same data provided to them before testing for the submission test. This allowed the participants to test the single submission process, gain an understanding of the data we are asking to collect for sherd submissions, and gave them all an opportunity to review the sherd detail page.

Single sherd submission was relatively straightforward for all participants. Participates read through the data, put the information in the proper fields, and attached the required RGB and XYZ files. All participants had difficulty reading the data fields and instructions. The instructions were in very small text under the entry boxes, and some important parts of the instructions were missing. Several participants questioned things like capitalization or the use of abbreviations, demonstrating the need for clear instructions. Two participants wondered why some fields were open text instead of being closed lists and were concerned that allowing open text would lead to problems in the datasets.

Once the data was entered, the participants were asked to submit the sherd but not process it. This is because SV matching takes several hours, and

so participants would not be able to review results for their submission during the testing time. Therefore, all participants reviewed a sherd detail page that had the same sherd data they submitted but had processed weeks before the interviews. By doing this, participants could view real matching results and provide feedback for this portion of the WE site.

Sherd Detail Page

Participants were asked to review the information provided on the sherd detail page. Most agreed that the most important data attached to the sherds was the Site and Provenience were the most important information, followed by curatorial and reference information. One user wanted to see the design ID associated with the sherd listed, while two others asked if they would be able to link to other sherds with the same design ID from the sherd detail page. Two participants pointed out that the sherd images lacked captions and why one image was larger than the other. An additional web design issue was discussed by participants when reviewing the sherd detail page. Participants felt that vital information was often hidden or difficult to find, and most had to be shown how to open the my sherd tab or the tab to show sherd details. One user said that in terms of design things just blended into the background and requested more spacing or something else to make various parts of the pages more visible.

Matching Results

After viewing the matching results, participants were asked to review the matching results for the sherd. It was explained to all participants that the SV algorithm returns the top 20 matches to the user, and they will be responsible for

selecting the true match if it is in the results list. Four participants expressed concern for the accuracy of matching data if they were solely responsible for the decision. Two assumed that a SV team member was involved in validation of data: One thought that any matched selected by users would be sent to our team to review that the match is correct, while another participant assumed that we would have someone go through their sherds and assign any design elements that were present in the sherd. Two participants stated they did not feel confident in their ability to select the true match and would appreciate some sort of verification from our team that their selection was correct, and that verification of data would give them more confidence in the data provided by other users.

Participants questioned just about every column presented in the matching results. They questioned what the matching score meant, how a design patch was generated, why the orientations of design patches didn't line up, if they would be able to manipulate the images shown, and wanted more design information to be available with the results. One participant pointed out that this section of the website has no instructions, leaving them confused at what might be the most vital point in the matching pipeline. That participant stated:

> If there are directions for people, they should be really explicit about what this screen is showing right because this is all the potential matches. … I guess I don't know what else you would do on here to make it more explicit but if there was like a read me file or you know there's a pdf of very explicit directions with screen shots. Even if you had a screenshot of this and you put it into a pdf and then

marked it up and annotated it, this is what this row means this is what this column is, so people can understand exactly what they're looking at.

Batch Sherd Submission

In addition to the single sherd submission portal, users can utilize the batch sherd submission template. The batch submission asks for all the same information as the single submission, but utilizes an Excel template to organize a batch of sherds for processing and submission. Users enter data for scanned sherds on the Excel template and submit this with a zipped folder that contains the RGB and XYZ files. The Excel template has several example sherd scans and a separate schema tab so that the user understands how to enter the data.

Only one participant had access to a 3D scanner and could test both the single and batch sherd submission process. This participant selected and scanned a small number of sherds before the day of their interview. They used the batch submission template developed specifically for SV/WE to record any data they had for the sherds. This participant had scanned archaeological objects before and had familiarity with the general process. They were able to use the template and had only a few minor clarification questions about sections where data was not needed or when the data was unknown. Overall they felt the scanning instructions and submission template are "pretty clear, this schema was very helpful, and [so was] the sample data that were provided in the form." However, when this participant attempted to submit their batch template through the website, they received an error message. At the time, error messages were common for the developing website and there was no explanation of what the error was or what caused

it. The participant felt that the batch submission was more useful than the single sherd submission, but was frustrated at getting an error message with no explanation or advice on how to fix the problem.

Project Documentation

Participants were shown the project documentation page during testing. At the time of testing, documentation included a scanning guidelines for the NextEngine scanner, a glossary of design elements, project news, and team bios. All users appreciated the presence of documentation but requested more robust information be provided. The scanning guidelines and glossary were discussed by two participants. One felt that the scanning guidelines should be greatly expanded to include how to build a platform and how to physically set up the scanner. Another participant felt a search function would be useful in the glossary documentation. Both participants felt PDF instructions would be helpful alongside the online documentation.

Sherd Schema

Participants were able to review the sherd schema that was created to assist them in compiling rich and accurate data for their sherd submissions. This schema was based on the MURR Template for Ceramic Artifacts with some SV/WE specific fields added to encourage future interoperability between the two databases. Overall, participants felt that the schema was “logical” and easy to understand. One participant was concerned that a user may not have all of the data requested in the schema and wondered if that would prevent submission. Two participants felt that sherd attributes such as temper and wall thickness would be useful information to collect.

The culture field was challenged in some manner by all participants. This field came over with the MURR template and was recognized as something that is difficult to define or agree on. One participant felt that a culture field lacked clarity because researchers have differing opinions on culture assignments. Another participant mentioned that they were aware of some debate about the use of culture and cultural phases, but admitted they haven't challenged its use. While this participant did not elaborate on any archaeological debate about the use of culture, another participant touched on the issue when discussing the use of an open text option for the field. They felt the if the culture field is used, it should be a drop down with limited options so that "people won't put in the crazy stuff that they believe." The participant felt that disagreements between archaeologists about cultural assignments would lead to data in this field that was inaccurate, didn't make sense, and wouldn't match other data of the same type in the database. Another participant flatly said "Swift Creek isn't a culture" when presented with the field.

Additionally, participants felt that the term lacks precision. One participant said that a cultural assignment could cover several hundred or a thousand years and therefore was not descriptive. They felt that the assignment of cultural "impedes science" by cluttering datasets with junk information. Another participant pointed out that if culture is being used to determine a relative date for the data, then the sherd type and period are enough to capture this information.

Participants also had an issue with the date range field requiring dates in the YBP format. The MURR template asks for date in the YBP format and this

was carried over to SV/WE. Two participants pointed out that AD/CE are generally standard and that YBP is “awkward” to calculate and use.

The final part of the sherd schema reviewed by the participants was the rights field. Overall, participants asked for more information in these fields. Participants were unsure what the CC license code meant and felt the rights statement should at least include the name of the person to contact for more information. Another participant pointed out that since the person who photographed the sherd is credited, the person who scanned it should be as well.

One participant highlighted a lack of specificity in what the rights field applies to. The rights field is general and does not specify if it applies to the published data, the photograph of the sherd, or both. Additionally, this participant stated an issue with determining who controls the rights to the published data:

> if someone comes and takes a photo at my lab, the rights to the image remain at the lab, not with the individual who took the photo. …images of the objects are considered the intellectual property of the museum. We’ve just spent all semester working with our digitization committee for the museum talking about developing an image use policy for the museum that deals with issues like this. For museums, it’s often really important to demonstrate that research is going on with our collections. So if there’s a public website that’s using our images and not crediting the institution where the objects are housed, then it’s diminishing the value of our collections because people don’t know that they’re ours.

While only one participant picked up on this issue with the rights field, all participants echoed the need to credit all institutions and people who were involved with the collection, description, and digitization of submitted data. Review of the rights field marked the end of the user test portion, and at this point participants were invited to stop sharing their screen and have a “face-to-face” conversation through the Zoom app.

SV/WE Use

Participants were asked about what they would like to use SV/WE for. The answers given mirrored those collected during the survey, but with more detailed information provided. The primary use will be the discovery of connections to other sites through the identification of design matches, and this connections research will be used in peer-reviewed research articles, conference papers, teaching lectures, and public materials.

Student labor was identified as the most efficient avenue for large-scale scanning. The potential for students to get experience with digital technologies and to use the data for projects was highlighted by two participants, who also understood that the huge task of photographing, scanning, and preparing data would not be accomplished without a significant contribution of paid and volunteer hours.

One participant felt their sherds had clear impressions that could be used for computer-aided design reconstruction. Three users felt that being able to access the 3D scan files to make 3D replicas that the public could freely handle. SketchFab was mentioned as a potential hosting place for 3D files since most

researchers are familiar with that archive. Four participants stated that they want to be able to download the data on WE to use in their own analysis. Two specified wanting to download just their query searches or matching results but one said they would want to download everything. Participants did not distinguish between sherd and design data and wanted to be able to access it all equally.

Participants who worked in museums could also see a potential for public outreach with the data collected by SV/WE. All users felt that the combination of unique designs and geospatial distribution would be of great interest to the public. One participant envisioned being able to build an exhibit around the stamped vessels in their museum's collection and any matching results found in other parts of the country. Another participant discussed how SV/WE data submission could contribute to broader museum goals:

> It works towards our broader museum goals of increasing digitization efforts and availability of our collections to the public. I think it's a great service assuming a permanence of the database. The story of finding paddle matches is something that is attractive to the general public, like thinking about these things moving. When you can visualize the whole paddle and it's a Jaguar or something like it, there's some charisma to it. I think that it has the potential to really capture public interest and the tech of it is a sell in that respect as well.

This participant also discussed how the data could be used for children's programs to teach them about paddle stamping, trade, and design matching, saying:

> I think there's just a lot to be said for the way that it connects. It creates connections, tangible connections that are otherwise intangible … because of how things, you know, how fragmentary our history is.

Collection Descriptions and Origins

Participants were asked to describe the data they have available for submission and publication through SV/WE. Most participants said they had thousands of complicated stamped sherds and two specified that they have large amounts of whole vessels in their collections. While all participants were confident they had huge volumes of sherd data to share, none felt comfortable estimating a number without a review of their collections. One participant said they had about 45 design reconstructions that they had drawn themselves from sherds in their collection, but all other participants stated they had zero reconstructed designs in their collections. The participant with design reconstructions works primarily with Mississippian paddle designs and said expressed a desire to publish their work through SV/WE, stating:

> I have designs that I've replicated or identified. … Although I have my own database of material, maybe there's a way to blend them together allowing for more collaboration and connections with other

researchers. I don't want to keep my stuff locked up. I want other people to use it.

Researchers acquired the complicated stamped sherds through three sources: modern fieldwork, laboratory-held legacy materials, and collections held by private citizens. Three participants have data they personally collected through their own more recent archaeological work, and another participant works in a laboratory that occasionally processes collections from modern excavations. Four participants said they have access to legacy collections that they would submit for publishing. This legacy material was collected across all periods of archaeological work and the oldest data was excavated 140 years ago. One participant has access to sherd data that was acquired and transferred between private collectors. Participants have more confidence in the contextual records for new collections done according to modern archaeological standards than the legacy and private collections that have sparse documentation.

Data Embargo

Participants were asked how they felt about temporary data embargoes for submitted sherd data. All participants had an obvious bias towards open sharing of archaeological data between researchers. Three participants stated they would have no need for an embargo on any data they submit for matching and publication. One plainly said they "didn't care" about an embargo while another said that embargoes go against their principles. The third said embargoes would not be necessary for their data, stating:

> No, I don't think we would want to have any kind of embargo whatsoever. We would go through a relatively long process of working with the tribal members before we would put up [scan and submit] anything. Once we got through that process we would want it to be publicly available.

Two participants felt that they might want embargoes for some data but not all data, and that the decision could only be made on a project-by-project basis. One of these participants was concerned about the potential for abuse of the data embargo, either people ignoring it and using data anyways or keeping data under an embargo for years or decades so that no one else can work with it. This participant also wanted to know if someone on the SV team would be monitoring the submissions and use to ensure that data was being used ethically.

Participants were generally against embargoes for their own data but understood the need for them in some cases, such as wanting to hold data until article publication. Participants were asked what they thought embargo terms should be. Most agreed that they should be no more than one to two years. One participant felt that the embargoed data only needed to remain hidden if published data was viewable by the public. If the embargoed data was viewable only by other researchers, it could be displayed with a note about the embargo and the expiration date.

Collaboration and Consultation

All participants said they would use SV/WE to collaborate with other researchers primarily by sharing and accessing standardized data. Participants

who work primarily in curation wanted to share data but were less concerned with accessing data from other institutions, while participants who were engaged in complicated stamped research wanted to share their data and access data submitted by other users. All participants felt that if done properly, SV/WE would help them facilitate conversations with other researchers and improve complicated stamped research.

Participants were asked if they had engaged in collaboration or consultation with descendent Native Nations on any past or current archaeological projects. Three participants stated that they regularly consult with Native Nations on projects and that they would consult with interested communities in the planning stage long before scanning was done on any ceramics from their collections. One participant was not actively involved in consultation but was involved with several projects that were. This participant expressed a desire to engage in consultation prior to scanning but seemed unsure at how to start the process. The fifth participant had done some consultation in the past on other projects but was unsure that the SCCS materials they work with could be culturally affiliated with the modern Native Nations in their working area.

Data from Mortuary Contexts

All participants were aware of ceramics from mortuary contexts in the collections they work with, primarily from legacy data housed in their institutions. The lack of detailed contextual information attached to legacy collections presents a problem when trying to determine the provenience of an object. When

asked to estimate the percentage of complicated stamped data they have from burial context, only two participants felt they could give a proper estimate: 60% for a participant whose institution curates a large amount of legacy data, and 1% for a participant who primarily works with modern excavated sites. Other participants felt that they could not make an estimation without going through the collections. One participant stated that there were certainly mortuary vessels in their legacy collections, but since the collections had so little contextual information they would not be able to determine if any specific artifact is associated with a burial.

Legacy collections are not the only archaeological collections that lack concise records. Another participant discussed how shoreline erosion exposes artifacts and ancestors while destroying the contextual relationship between them, making the identification of mortuary items from modern washed-out sites difficult or impossible. A participant who works with private collections stated that they were unsure of how to handle artifacts that were looted from burial mounds. The participant explained that a private citizen had removed objects from a burial mound before laws were in place to prevent looting of archaeological sites. The collector gave the objects to another private citizen and informed them that some of the objects had been buried with people, but no provenience records were kept.

Participants were asked their opinions on the use and publication of burial data within the context of the SV project. While participants could see the research benefit to scanning, matching, and accessing sherd data from burial

context, they all acknowledged that descendent Native Nations would be opposed to the open publication of images of burial objects. One participant who routinely consults with Native Nations on archaeological projects stated they would not seek to scan any materials from mortuary contexts:

> I would be mostly against uploading scans of burial items. I don't think it's appropriate. I mean there are thousands and thousands of sherds from non-burials. … if people really need that burial information, it's all in published sources or photographed and archived elsewhere.

Another participant felt that data from burials needs to be included in SV/WE so that researchers can have a better understanding of all aspects of past people's lives, stating that "the things you put with burials are among the most important things in your social life or spiritual life or political life."

Participants felt that a combination of consultation and restricted access would be needed if burial data is to be used in SV/WE. Four participants felt that consultation with Native Nations would be required prior to scanning anything from a burial context and would only scan those sherds with express permissions from descendent communities. One participant questioned the legitimacy of connecting modern Native Nations to the people who made SCCS, stating:

> This is 1400 years ago, how are you going to prove a connection? And even if it's a genetic connection, is it a cultural connection? …But if somebody has a legitimate claim, I want to respect it.

All participants recognized that the public nature of SV/WE would be a concern with burial data. Participants suggested that if mortuary data is included that there should be a process for tagging it as such so that it could be filtered and removed from search results or hidden from public view and available only to authorized accounts. Consultation prior to scanning projects would allow researchers to determine levels of appropriate study and inclusion of mortuary objects or artifacts from legacy collections with known burial items but no contextual data.

SV/WE Expansion and Maintenance

Participants felt that SV/WE would be most useful if it was expanded past the SCCS type and actively maintained by the SV team. All participants have other kinds of complicated stamped and check stamped ceramics in their collections. Only one participant works primarily with SCCS, and the other participants claimed that SCCS was a minority ware in their collections. Participants have access to many kinds of check and complicated stamped ceramics from the Woodland, Mississippian, and Post-Contact periods in their collections and questioned if SV/WE would be expanded for them to include this data. They fell that SCCS is “a great place to start” but that applying computer assisted algorithmic matching to more generalized check and complicated stamp paddles would allow for more site-to-site connections research.

Two participants questioned if WE would be expanded past stamped ceramics to include other common non-stamped types found in the southeast. These participants interested in publication of the ceramics, not matching them to

other similar ceramics. One participant mentioned having a lot of incised ceramics in their collection that could be shared. Another participant discussed an online ceramics database that is focused on the American southwest that allows users to filter heat maps based on characteristics like ceramic frequency and type and felt that having something similar for the southeast.

Two participants were concerned with the long-term sustainability of SV/WE. They discussed issues of long-term funding, site maintenance, accessibility of information, getting buy-in from outside institutions to include their data, and the ability to continue innovating in response to user needs and future projects.

Conclusion

SV/WE will be used primarily to promote movement and connections research on populations who created paddle stamped pottery. SV/WE is attractive to researchers who work directly with complicated stamped ceramics as well as laboratory management whose main interest is making data available for study. Based on the results of the user needs study, the SV/WE team should consider four key user needs to improve the project and meet user expectations: 1. Ensure that WE is easy to use at all levels; 2. Anticipate how SV/WE will be used to facilitate training, collaboration, and outreach; 3. Provide a robust digital archive that contains clean data and identify data policies needed to support that goal; 4. Plan for continued maintenance, support, and evolution of SV/WE.

UX – Design, Functionality, and Data Submission

User testing highlighted several areas that the WE UX could be improved, and most of this feedback has been used by the SV team to make improvements. Users expect it to be easy to access and share information through SV/WE. Overall, the WE web design had a hidden feel. This was changed to make navigation throughout the site easier by making choices more obvious. Small tabs that were used to expand hidden information were made larger and had text added that made their purpose clear. The multi-sherd icon that identified site locations on the map has been changed to a simple red dot,

and the map zoom has been increased. Text size was increased so that information could be easily seen and read.

The Design and Sherd search functions were changed. Results now display the first 60 results and allow the user to show more or all using a drop-down menu. Search functionality was completely reworked to include location searching, allow users to choose between “and” and “or” searching, and a search statement is generated with each search. Issues in searching were fixed, including the inability to select multiple terms and preventing the results from being reset after you viewed a result and then returned to the page. Features were added including a clear search button, text-based searching that utilizes multiple data fields, clicking a result opens a new tab, search results display the first 60 results, and the map size was adjusted to allow better balance on the page. Site, County, and State location data was added to the Design and Sherd detail pages.

Users felt that the data presented could be more robust or clear in some cases. The Schema pages were standardized, and a searchable Site ID table was added. Users requested PDF guides for all data presented on the website and the data submission processes. PDFs and video instructions will be created once all processes are finalized. A Temper/Inclusions field was added to the Sherd data. The Culture field was removed from the Sherd data. All interview participants challenged this field in some way: Either they challenged the idea that the ceramic types would represent a specific culture, or they argued that the assignment of a culture based on pottery was too vague to have any real

scientific meaning. The Date field was changed to reflect the more common CE/AD format. Several open text fields, such as period or institution, were standardized and condensed into drop down lists to prevent mislabeled data. A notes field is available for users to add any other information they feel is missing.

At the time of this writing, the glossary information is being expanded and the web design for this page is being updated to make it easier to navigate. To support querying sherds by design information, filler is being expanded to include multiple kinds of linear and shape fill. Unless identification of fill types can be automated, this update will require more input from the user at time of sherd submission but will assist in filtering huge volumes of data.

A decision was made by the SV team to remove the single sherd submission after the user testing. While it was useful for testing the website functionality and gathering feedback about the sherd data collected, we felt the batch submission would be utilized more frequently. Batch submission saves the users time by allowing larger amounts of data to be entered and processed. Additionally, as changes have been made to the back-end sherd processing it became challenging to keep the single sherd submission portal working. Error messages related to batch submission now have larger text, stay open until a user closes them, and identify several common errors so the user can fix the template and re-submit.

Training, Collaboration, Consultation, and Outreach

Users don't just see SV/WE as a tool for complicated stamped research. They also see it as tool to connect with other researchers and a teaching

resource. The study shows that researchers want to use SV/WE to give students experience with digital archaeological projects. Student labor will be used to scan sherds, and students can use the data in WE for research projects. Users also want to use SV/WE as a tool to facilitate conversations with other complicated stamped researchers. Providing a database to standardize individual projects is a step towards large-scale synthesis that broadens archaeological understandings of the past.

Data from the interviews suggests consultation with Native Nations should be encouraged for scanning projects. Some participants are already actively collaborating with Native Nations and plan to include them in scanning projects. Others are open to consultation but are unsure of how to start these conversations. It would be ideal if the SV team could give some assistance to those users who are unsure of how to start the consultation process, but we have just begun that process ourselves. The SV team has started consultation to scan and publish sherds from the Broyles collection held at UGA. UGA acts as a mediator, ensuring the transfer of information and correspondence between our agency and the Tribal representatives for federally recognized Native Nations.

The Broyles collection contains sherds from Fairchilds Landing (9SE14), Swift Creek (9BI3), Mandeville (9CY1), Quartermaster (9CE42), Milamo (9WL1), and Kolomoki (9ER1). The Muscogee (Creek) Nation has been responsive to our scanning proposals, providing feedback and requesting copies of data generated during the project for Fairchilds Landing, Swift Creek, Mandeville, and Quartermaster. Additionally, The Muscogee (Creek) Nation has requested

consultation for any reuse of the Broyles data, images, and scans and this request is reflected in the published rights statements for the sherd data. The Shawnee Tribe and Thlopthlocco Tribal Town have expressed interest in findings from the Quartermaster site. No other responses have been gathered through these consultation efforts. At the time of this writing, Milamo and Kolomoki consultations were still pending.

Since the data on WE website is open and free, it means that it will be accessible to members of the public with an interest in archaeology. Additionally, researchers can use the data for public outreach. SCCS designs are part of a beautiful artistic tradition that can easily capture people's attention, and their uniqueness can be used to clearly demonstrate connections of ancient people across the landscape. People with an interest in archaeology are free to browse all published SV/WE data. The first person to use the WE website contact link in July 2022 was a non-researcher who found a sherd they suspected to be SCCS, but did not see a match on the website and wanted to know if we could assist in identifying it.

Data Policy

SV/WE should be prepared for huge volumes of sherd submissions and a limited amount of design submissions. SCCS data is housed across dozens of institutions held in legacy or modern collections. These collections may have thorough contextual records or be missing vital data. SV/WE data policies should accommodate legacy and modern collections, ensure that contributing

researchers and institutions get credit when their data is used, and provide protections for sensitive burial data.

Ensuring credit for all people involved in a scanning project has been a consideration for the SV team since the development of project metadata standards. The sherd data collected for SV/WE submission gives credit to the person leading the scanning project, the person and institution responsible for excavation, the institution that houses the collection, and the person who scans and photographs the sherds. For small projects, one person may be responsible for all these tasks. However, scanning work for the SV project has demonstrated that when working with legacy collections these fields are vital for distinguishing between many contributors. Since student labor will be utilized to prepare sherd data, the names of the people who physically scan and photograph the sherds is recorded so that they get recognition for their work.

Users are concerned about getting proper credit if their data is reused by other users. While it would be far simpler to apply a standard Creative Commons license to all data across the website, this may not be a feasible option for SV/WE. Different artists may want different levels of control over their work. Broyles wanted her work to be widely available, while Snow has taken a more protective approach to his designs. The SV team should suggest a CC license to all contributors and be willing to work with those who want to retain more control over their intellectual property so that it can be included in the database. Allowing flexibility with rights can also accommodate users who may want temporary data embargoes or those who are working with collections they do not control.

Currently, the SV project uses a CC Attribution-NonCommercial-ShareAlike (CC BY-NC-SA) license for data presented on the website. This license allows users to share and adapt data with the requirements that they credit the original source, indicate changes they made, not use materials for commercial purposes, and share anything produced using the data under a similar license.

Users were not overly concerned about data embargoes but agreed they could be used on a limited basis, such as during preparation for publications. Users felt embargoes should expire after one to two years. Currently, the SV/WE system hides sherd submissions until a user chooses to publish them, at which point they become visible on WE immediately. This is to give users time to review and select matches, and to ensure that low-quality sherds and data are not automatically made public. The SV/WE system is not currently set up to support expiring embargoes or to monitor the data that users have in their accounts but have not published.

Two additional features could assist users who submit data to connect with users who are reusing that data: User profiles and a submit a citation function. User profiles could display general information about the person or institution responsible for contributing or reusing the data, the scanning projects they are running, and provide a point of contact for questions about the data or discussions about collaboration. A submit a citation function would allow users who reuse data for publications or other purposes to link to those works. This would benefit users who submit data by giving them an opportunity to see how their data was reused.

SCCS is found in burial and non-burial contexts, and the SV team should consider how to handle projects that include mortuary data as well as legacy collections that contain burial items but lack contextual records. Given the results of this study and recent consultation between the SCDNR and the Muscogee (Creek) Nation, it is recommended that SV/WE does not allow public access to data known to be from burials, including photographs and 3D scans. If researchers would like to utilize mortuary data in their scanning projects or are dealing with legacy collections that have known burial data but little contextual information, the SV team should request that these projects to go through some form of consultation with Native Nations interested in their areas of work so that a plan can be developed on how to best handle these sensitive materials. If mortuary data is to be included in the published WE sherd data, it should be clearly labeled and in a secure part of the database only accessible to authorized users, such as researchers and descendent communities with verified accounts.

Long Term Maintenance, Support, and Expansion

Users want to know what is planned for long term support, maintenance, and expansion of SV/WE. Users were concerned with the quality of the data that would be published through WE and wanted to know what kind of support is available from the SV team. Providing detailed text and video guides will assist with user confidence in their ability to provide robust and accurate data.

Users also have a wide variety of concerns when they consider their scanning projects: Cost of scanning equipment and student labor, identifying and consulting with Native Nations that may be interested in their projects, collecting

and preparing the data, accurately selecting the true match in matching results, and the accuracy of data submitted by other users. In addition to detailed guides, the SV team should be prepared to offer one-on-one guidance to scanning partners from project planning through data publication.

Data from the study shows that SV/WE will benefit more people by expanding into other kinds of paddle stamped ceramics. The uniqueness of SCCS has made it a focus for matching and design reconstruction, but it is only one of many types of paddle stamped pottery. Users who work with later complicated stamped wares could see a benefit to paddle matching within and across sites and wanted SV/WE to expand to meet this need. The SV team has started working with South Carolina collections in preparation for expansion into other kinds of complicated stamped sherds. For successful expansion three tasks must be accomplished: Scanning of other complicated stamped sherd types and the reconstruction of their paddle designs; Testing to determine if SV can successfully match these more general designs forms; and the WE design and sherd schemas will need to be updated to include a more comprehensive list of complicated stamped types and elements specific to Mississippian designs.

Users are also concerned with the long-term maintenance and upkeep of WE. Users wanted to know if SV/WE was funded to support long-term maintenance so that the digital collection could be built up over several years as institutions got their projects off the ground. Users felt this sort of long-term planning would also be necessary for SV/WE be responsive to changing user

needs or issues, and adaptive to new technologies and research that could improve the algorithms and digital collections.

Future Research

There are still several parts of SV/WE that would benefit from continued research. While this user needs study captures the opinions of archaeological researchers, other user populations are not represented. The SV project would benefit from consultation with interested descendent communities. While consultation has been started to access the Broyles collection, input on the whole SV project should be sought. Project level consultation would provide valuable feedback for all aspects of SV/WE and bring the project into compliance with modern ethical standards. Additionally, consultation could help the SV team build relationships that will allow us to assist scanning partners in starting their own conversations with descendent communities. The opinions of students and the public are also not considered in this study.

More testing is needed on the batch submission template and upload process. Given the volume of sherds expected this part of SV/WE needs to run as smoothly as possible. If it is difficult for users to enter data into the SV/WE system, then users may simply choose to not use SV/WE. Once SV/WE are established and researchers have gained experience with scanning projects, a study utilizing focus groups can gather feedback for future improvements to ensure navigation through this data is simple and to address any issues that may prevent use.

Should SV/WE seek additional grant money for expansion, funds should be set aside for user needs testing and consultation. Repeated testing before and after major SV/WE updates can ensure that the changes being made are useful and desired. These funds could also be used to provide honorariums to interview participants and tribal representatives involved with the consultation process. Funding would be especially helpful to Native Nations that were forcefully removed from the southeast and must travel to participate in consultation. Additionally, grants could be sought specifically to aid Native Nations who may want to set up digital systems or physical manuscripts that hold the SV/WE data so that their community members can access and interact with the information freely.

Expansion past complicated stamped pottery would be desirable for researchers who work with southeastern ceramics. Check stamped pottery is ubiquitous across the southeast. It was used for longer than complicated stamped pottery and has several distinct check design methods. Human vision matching and paddle reconstruction has not been attempted on a large scale, but an algorithm trained to read linear impressions could assist in this endeavor. Stamped ceramics are unlikely to be the only type of pottery found at an archaeological site. A central database for southeastern ceramic data would allow researchers to large-scale ceramic analysis and provide an avenue for data publication that satisfies modern grant requirements.

References

Altschul, J. H., Kintigh, K. W., Klein, T. H., Doelle, W. H., Hays-Gilpin, K. A., Herr, S. A., … & Sabloff, J. A. (2018). Fostering collaborative synthetic research in archaeology. *Advances in Archaeological Practice, 6*(1), 19-29. http://dx.doi.org/10.1017/aap.2017.31

American Anthropological Association. (1998). Code of ethics of the American Anthropological Association. http://rdcms-aaa.s3.amazonaws.com/files/production/public/FileDownloads/pdfs/issues/policy-advocacy/upload/ethicscode.pdf

Anderson, D. G. (1994). The Savannah River chiefdoms: Political change in the late prehistoric southeast. University of Alabama Press.

Anderson, D. G., Bissett, T. G., Yerka, S. J., Wells, J. J., Kansa, E. C., Kansa, S. W., … & White, D. A. (2017). Sea-level rise and archaeological site destruction: An example from the southeastern United States using DINAA (digital index of North American archaeology). *PLoS ONE, 12*(11). http://dx.doi.org/10.1371/journal.pone.188142

Anderson, D. G., & Mainfort, R. C. Jr. (2002). An introduction to Woodland archaeology in the southeast. In D. G. Anderson & R. C. Mainfort, Jr. (Eds.), *The Woodland southeast* (pp. 1-19). The University of Alabama Press.

Anderson, D. G., & Sassaman, K. E. (2012). *Recent developments in southeastern archaeology: From colonization to complexity*. The Society of American Archaeology, Washington.

Broyles, B. J. (1962). A Lamar period site in southwest Georgia, 9Cla51. In A. R. Kelly, R. Nonas, B Broyles, C. de Baillou, D. W. Chase, & F. T. Schnell, Jr. (Eds.), *Survey of archaeological sites in Clay and Quitman counties, Georgia*. University of Georgia Laboratory of Archaeology Series, Report No. 5. Retrieved on 30 Aug 2022 from https://archaeology.uga.edu/sites/default/files/2021-12/uga_lab_series_5.pdf

Broyles, B. J. (1968). Reconstructed designs from Swift Creek complicated stamped sherds. *Southeastern Archaeological Conference Bulletin, 8*, 49-74.

Broyles, B. J., Davis, H., Groh, L., Marrinan, R., Rourke, J., Sullivan, L., & White, N. M. (1994). *Interview with Bettye J. Broyles*. [Unpublished transcription]. Recorded 12 November 1994 in Redbank, Tennessee.

Byers, A. M. (2015). *Reclaiming the Hopewellian ceremonial sphere: 200 B. C. to A. D. 500.* University of Oklahoma Press.

Caldwell, J. R., & Smith, B. A. (1978). *Report of the excavations at Fairchild's Landing and Hare's Landing, Seminole County, Georgia.* [Unpublished manuscript]. NPS Purchase Order #PX589070204.

Caldwell, J. R., Williams, M., & Smith, K. Y. (2014). *Archaeological excavations at Fairchilds Landing and Hares Landing, Seminole County, Georgia* (M.

Williams, K. Y. Smith, S. Johns, & K. Brown, Eds.). University of Georgia Laboratory of Archaeology Series, Report Number 82. (Original work unpublished)

Chase, D. W. (1998). Swift Creek: Lineage and diffusion. In M. Williams & D. T. Elliot (Eds.), A w*orld engraved: Archaeology of the Swift Creek culture* (pp. 48-60). The University of Alabama Press. Archaeology Series, Report Number 82. (Original work unpublished)

Delva, M. (2018). Decolonizing the prisons of cultural identity: Denominational archives and indigenous “manifestations of culture”. *Toronto Journal of Theology, 34*(1), 3-20. http://dx.doi.org/10.3138/tjt2017-0016

Diachronic Research Foundation. (2015-1). *Deptford overview.* Retrieved 16 November, 2020 from http://www.scpottery.com/middle-period/deptford/deptford-overview

Diachronic Research Foundation. (2015-2). *Deptford Simple stamped*. Retrieved on 16 November, 2020 from http://www.scpottery.com/middle-period/deptford/deptford-simple-stamped

Diachronic Research Foundation. (2015-3). *Refuge Simple stamped*. Retrieved on 16 November, 2020 from http://www.scpottery.com/early-period/refuge/refuge-simple-stamped

Diachronic Research Foundation. (2015-4). *Thoms Creek Simple stamped*. Retrieved on 16 November 2020 from http://www.scpottery.com/early-period/thoms-creek/thoms-creek-simple-stamped

Elliott, D. T. (1998). The northern and eastern expression of Swift Creek culture: Settlement in the Tennessee and Savannah River valleys. In M. Williams & D. T. Elliott (Eds.), A *world engraved: Archaeology of the Swift Creek culture* (pp. 19-35). The University of Alabama Press.

First Archivists Circle. (2007, April 9). Protocols for Native American Archival Materials. https://www2.nau.edu/libnap-p/protocols.html

Holmes, W. H. (1903). *Aboriginal pottery of the eastern United States. Annual Report 20*. Smithsonian Institution, Bureau of American Ethnology. Retrieved February 17, 2019 from https://www.biodiversitylibrary.org/item/88647#page/1/mode/1up

Gardiner, G., McDonald, J., Byrne, A., & Thorpe, K. (2011). Respect, trust and engagement: Creating an Australian indigenous data archive. *Collection Building, 30*(4), 148-152. http://dx.doi.org/10.1108/01604951111181100

Green, H. E., & Courtney, A. (2015). Beyond the scanned image: A needs assessment of scholarly users of digital collections. *College & Research Libraries, 76*(5), 690-707. http://dx.doi.org/10.5860/crl76.5.690

Green, H. E. & Lampron, P. (2017). User engagement with digital archives for research and teaching: A case study of Emblematica Online. *portal: Libraries and the Academy, 17*(4), 759-775. http://dx.doi.org/10.1353/pla.2017.0045

Jennings, J. D. & Fairbanks, C. H. (1939). Pottery type description for Swift Creek Complicated Stamped. *Southeastern Archaeological Conference Newsletter, 1*(2). Retrieved from

http://www.southeasternarchaeology.org/wp-content/uploads/SEAC-Newsletter-Vol.-01-No.-2-March-1939.pdf on 18 November 2020.

Jones, C. C., & Schnell, F. T. (1999). *Antiquities of southern Indians, particularly of the Georgia tribes.* University of Alabama Press.

Kansa, E. C., Kansa, S. W., Wells, J. J., Yerka, S. J., Myers, K. M., DeMuth, R. C., … & Anderson, D. G. (2018). The digital index of North American archaeology: Networking government data to navigate an uncertain future for the past. *Antiquity, 92*(362), 490-506.

Kelly, A. R. (1938). *Preliminary report on archaeological explorations at Macon, Georgia*. Smithsonian Institution, Bureau of American Ethnology, Bulletin 119.

Kelly, A. R., & Smith, B. (1975). *The Swift Creek site, 9BI3, Macon, Georgia*. University of Georgia Laboratory of Archaeology, Manuscript #333, National Park Service Purchase contract no. CX500041720

Lewis, T. N., & Kneberg, M. (1946). *Hiwassee Island: An archaeological account of four Tennessee Indian peoples.* University of Tennessee Press.

Lu, Y. (2020). Snowvision. [Source Code]. https://github.com/rudylyh/SnowVision

Lu, Y., Zhou, J., McDorman, S. T., Zhang, C., Scott, D., Bukuts, J., … & Wang, S. (2022). Snowvision: Segmenting, identifying, and discovering stamped curve patterns from fragments of pottery. *International Journal of Computer Vision* 130, 2707-2732. DOI: 10.1007/s11263-022-01669-7

Lu, Y., Zhou, J., Chen, J., Smith, K. Y., Wilder, C., & Wang, S. (2018). Curve-structure segmentation from depth maps: A CNN-based approach and its

application to exploring cultural heritage objects. *Proceedings of the AAAI Conference on Artificial Intelligence, 32*(1).

Luker, T. (2017). Decolonising archives: Indigenous challenges to record keeping in "reconciling" settler colonial states. *Australian Feminists Studies, 32*, 108-125. http://dx.doi.org/10.1080/08164649.2017.1357011

Marsh, A. (1998). Swift Creek site excavations: The Works Progress Administration and black labor. In M. Williams & D. T. Elliott (Eds.), *A world engraved: Archaeology of the Swift Creek culture* (pp. 12-18). The University of Alabama Press.

McDorman, S. T. [Snowvision World Engraved]. (2021, April 18). *World Engraved user needs study: Sam McDorman 3MT* [Video]. YouTube. https://youtu.be/phxOmsdwHTc

McDorman, S. T. (2022-a). STM002. Retrieved on 29 August 2022 from http://worldengraved.org/detail-view/search/Design_STM002.

McDorman, S. T. (2022-b). STM003. Retrieved on 29 August 2022 from http://worldengraved.org/detail-view/search/Design_STM003.

McDorman, S. T. (2022-c). STM004. Retrieved on 29 August 2022 from http://worldengraved.org/detail-view/search/Design_STM004.

McDorman, S. T. (2002-d). STM005. Retrieved on 29 August 2022 from http://worldengraved.org/detail-view/search/Design_STM005.

McGimsey, C. R., III. (1972). *Public archaeology*. London: Seminar Press.

Mills, A. (2015). User impact on selection, digitization, and the development of digital special collections. *New Review of Academic Librarianship, 21,* 160-169. http://dx.doi.org/10.1080/13614533.2015.1042117

Moore, C.. B., Brose, D. S., & White, N. M. (1999). *The northwest Florida expeditions of Clarence Bloomfield Moore* (D. S. Brose & N. M. White, Eds.). The University of Alabama Press. (Original work published 1901-18)

MURR. (n.d.). Instructions for submitting samples: Template for pottery, temper, and clays. Retrieved on 26 July 2022 from https://archaeometry.missouri.edu/how_to_submit.html

Office of Research, University of South Carolina. (2021). *Discover UofSC collected abstracts*. https://sc.edu/about/signature_events/discover_uofsc/documents/2021_abstract_book_final.pdf

Open Context. (n.d.). Digital Index of North American Archaeology (DINAA). Retrieved on 28 August 2022 from http://ux.opencontext.org/archaeology-site-data/

Pluckhahn, T. J. (2002). Kolomoki: Settlement, ceremony, and status in the deep south, A.D. 350 to 750. University of Alabama Press.

Pluckhahn, T. J. (2007). Reflections on paddle stamped pottery: Symmetry analysis of Swift Creek paddle designs. *Southeastern Archaeology, 26*(1), 1-11.

Sassaman, K. E. (2002). Woodland ceramic beginnings. In D. G. Anderson & R. C. Mainfort, Jr. (Eds.), *The Woodland southeast* (pp. 398-420). The University of Alabama Press.

Sebastian, L. (2009). The future of CRM archaeology. In L. Sebastian & W. D. Lipe (Eds.), *Archaeology & cultural resource management: Visions for the future* (1-18). Santa Fe, NM: School for Advanced Research.

Sears, W. H. (1992). Mea culpa. *Southeastern Archaeology, 11*(1), 66-71.

Sears, W. H., Williams, M., & Steinen, K. T. (2013). *Kolomoki Memoirs* (M. Williams & K. T. Steinen, Eds.). University of Georgia Laboratory of Archaeology Series, Report Number 70.

Shepard, A. O. (1956). *Ceramics for the archaeologist*. Braun-Brumfield.

Smith, B. A. (1998). Neutron activation analysis of ceramic from Mandeville and Swift Creek. In M. Williams & D. T. Elliot (Eds.), *World engraved: Archaeology of the Swift Creek culture* (pp. 112-129). The University of Alabama Press.

Smith, K. Y., Keith, S., & Blackmon, J. (2019, September 18). Swift Creek pottery from Pinson Mounds and the development of a complicated stamped pottery design matching application. *Tennessee Council for Professional Archaeology*. https://tennesseearchaeologycouncil.wordpress.com/2019/09/18/swift-creek-pottery-from-pinson-mounds-and-the-development-of-a-complicated-stamped-pottery-design-matching-application/

Smith, K. Y., & Knight, V. J., Jr. (2012). Style in Swift Creek paddle art. *Southeastern Archaeology, 31*(2), 143-156.

Smith, K. Y., & Knight, V. J., Jr. (2014). Swift Creek design elements and their layouts. *Poster presented at the 79th Annual Meeting of the Society for American Archaeology, Austin, TX*.

Smith, K. Y., & Knight, V. J., Jr. (2016). Swift Creek paddle designs and the imperative to be unique. *Southeastern Archaeology, 36*(2), 122-130. http://dx.doi.org/10.1080/0734578X.1246342

Snow, F. (1977). *An archaeological survey of the Ocmulgee Big-Bend region*. Occasional Papers from South Georgia, Number 3. South Georgia College.

Snow, F. (1998). Swift Creek design investigations: The Hartford case. In M. Williams & D. T. Elliott (Eds.), *A World engraved: Archaeology of the Swift Creek culture* (pp. 61-98). The University of Alabama Press.

Snow, F. (2007). *Swift Creek design catalog.* [Unpublished manuscript]. Division of Natural Sciences, Physical Education, and Mathematics, South Georgia State College.

Snow, F., & Stephenson, D. K. (1998). Swift Creek designs: A tool for monitoring interaction. In M. Williams & D. T. Elliott (Eds.), *A world engraved: Archaeology of the Swift Creek culture* (pp. 61-98). The University of Alabama Press.

Society for American Archaeology. (1996). *SAA principles of archeological ethics*. http://onlinedigeditions.com/publication/?i=210655&article_id=1716656&view=articleBrowser&ver=html5

Society of American Archivists. (2020, August). *SAA core values statement and code of ethics*. https://www2.archivists.org/statements/saa-core-values-statement-and-code-of-ethics

University of Florida, Florida Museum. (2022, January 19). Swift Creek pottery collection. https://www.floridamuseum.ufl.edu/flarch/collections/swift-creek-pottery/

University of Florida, Florida Museum. (n.d.). Swift Creek pottery. https://www.floridamuseum.ufl.edu/swift-creek/

Wallis, N. J. (2011). *The Swift Creek gift: Vessel exchange on the Atlantic Coast*. Tuscaloosa, AL: The University of Alabama Press.

Wells, J. J., Kansa, E. C., Kansa, S. W., Yerka, S. J., Anderson, D. G., Bissett, T. G., … & DeMuth, R. C. (2014). Web-based discovery and integration of archaeological historic properties inventory data: The digital index of North American archaeology (DINAA). Literary & Linguistic Computing, 29(3), 349-360. http://dx.doi.org/10.1093/llc/fqu028

Wilder, C., McDorman, S. T., Zhou, J., King, A., Lu, Y., Smith, K., … Simmons, W. M. J. (2020). Snowvision: The promise of algorithmic methods in southeastern archaeological research. *Polish Journal for American Studies, 14*, 165-185. https://paas.org.pl/wp-content/uploads/2020/12/PJAS_14_autumn_2020.pdf

Willey, G. R. (1949). The archaeology of the Florida gulf coast. Smithsonian Miscellaneous Collections #113.

Williams, M., & Elliot, D. T. (1998). A w*orld engraved: Archaeology of the Swift Creek culture* (pp. 1-11). The University of Alabama Press.

Williams, M. W. & Thompson, V. D. (2014). *Simple stamped*. Retrieved on 16 November 2020 from https://archaeology.uga.edu/taxonomy/term/3905

Wise, M., & Kostelecky, S. R. (2018). Respecting the language: Digitizing Native American language materials. *Digital Library Perspectives, 34*(3), 200-214.

Wu, A., Thompson, T., Vacek, R., Watkins, S., & Weidner, A. (2016). Hitting the road towards greater digital destination: Evaluation and testing DAMS at University of Houston Libraries. *Information Technology & Libraries, 35*(2), 5-18. Htpp://dx.doi.org/10.617/ital.v35i29152

World Engraved. (2020, July). *Project news*. Retrieved on 28 October 2020 from http://worldengraved.org/news

Zhou, J., Lu, Y., Smith, K. Y., Wilder, C., Wang, S., Sagona, P., & Torkian, B. (2019). A framework for design identification on heritage objects. *Proceedings of the Practice and Experience in Advanced Research Computing on Rise of the Machines (learning),* pp. 1-8. DOI: 10.1145/3332190

Zhou, J., Smith, K. Y., Wilsbacher, G., Sagona, P., Reddy, D., & Torkian, B. (2020). Building science gateways for humanities. *Practice and Experience in Advanced Research Computing*, pp. 327-332. DOI: 10.1145/3396628

Zhou, J., Yu, H., Smith, K. Y., Wilder, C., Yu, H., & Wang, S. (2017). Identifying designs from incomplete, fragmented cultural heritage objects by curve-

pattern matching. *Journal of Electronic Imaging, 26*(1). DOI:

10.1117/1.JEI.26.1.011022

Appendix A: Survey Questions

The following list of questions was used in the initial online survey.

Survey Key: (Instructions given to participants) [Survey formatting]

1. What is your profession? (Select all that apply)

Archaeologist

Curator

Artist

Educator

Researcher (Enter area of study)

Other (Please specify)

2. What kind of stamped ceramics do you work with?

[Open-ended]

3. How long have you worked with stamped ceramics?

0-5 Years

6-10 Years

11-15 Years

16-20 Years

21+ Years

4. What kind of activities involve you with stamped ceramics? (Select all that apply)

Excavation

Curation

Research

Design Reconstruction

Vessel Reconstruction

Other (Please Explain)

5. How do you think a stamped ceramic design database could assist you?

[Open-ended]

6. How do you think a stamped ceramic matching program could assist you?

[Open-ended]

7. How would you use the information that you found in a complicated stamped design database?

[Open-ended]

8. Do you have access to a three-dimensional scanner?

Yes

No [Skip to Question 10]

9. What brand and model three-dimensional scanner do you have access to?

[Open-ended]

10. Would you want access to the three dimensional ceramic sherd files submitted by other users?

Yes

Maybe

No

11. Are you interested in contributing stamped ceramic sherd data to Snowvision/World Engraved?

Yes

No [Skip to Question 17]

12. Please estimate how many sherds you have for submission”

[Open-ended]

13. How were these sherds collected? (Select all that apply)

Archaeological excavation or survey

Private collection

Other (Please explain)

14. Would you expect any restrictions on how your submitted sherd data is used?

Yes

No [Skip to Question 16]

15. What restrictions would you request for submitted sherd data?

[Open-ended]

16. How long would you be willing to wait for Snowvision to return matching results for sherds you submit?

Several hours

Several days

Several weeks

More than a month

17. Are you interested in contributing carved paddle design reconstructions to World Engraved?

Yes

No [Skip to Question 20]

18. If you contributed carved paddle design reconstructions, would you expect any restrictions on how that data is used?

Yes

No [Skip to Question 20]

19. What restrictions would you request for submitted carved paddle design reconstructions?

[Open-ended]

20. Would you be willing to watch short videos about Snowvision/World Engraved sherd submission and query procedures?

Yes

No

21. Can you suggest any potential problems or concerns that should be considered when building Snowvision/World Engraved?

[Open-ended]

22. Would you like to participate in follow-up interview and user tests for Snowvision/World Engraved? These interviews will take place in the Spring 2020 semester. They will last approximately 1 hour. If you would like to participate or would like more information, please include your contact information when prompted.

Yes, I would like to participate in follow-up interviews and user tests

Maybe, please send me more information about the follow-up interviews and user tests.

No, I would not like to participate in follow-up interviews or user tests. [Skip to end of survey]

23. Please provide an email address or phone number so that you can be contacted about the follow-up interviews and user tests:

[Open-ended]

Appendix B: Interview Guide

The following interview guide was used during the user testing and interviews.

Interview Guide Key:

- Primary Question
    - Probing Question

Start:

Thank you for participating in the Snowvision User Testing! Please share your screen and ensure you have the Sherd Information I sent for the Single Sherd Submission Test ready.

Before we begin, have you visited the World Engraved website prior to this user test?

Login:

Please open the World Engraved Website and log in using the email and password I provided in the chat window here.

Design Query:

The purpose here is to test the search functionality (mechanics, ease of use) and usefulness of the design metadata fields.

Please navigate to the Search tab and select Design Search. Run a query for the Site Kolomoki and the Design Element Figure 8. (observe process)

- How many results do you see? (21)
- Please display all queried designs on one page.

Now, refine the query by adding Court Card and Double-Axis symmetry to the search. How many results were returned? (15)

Now, please begin a new query for the elements Bracket, Cross, and Arch.

- How many results are returned? (75)
- Please review the query results and map. What are your opinions on how the results are returned?
    - Is the results page easy to navigate? What is your opinion of the map display?
- What is your opinion of the design query process?
    - What else would you like to be able to search by? Was the search difficult or easy? What issues did you have when changing your query?

Please find the design BBP01-2 and click “View Info”

Here, we have several fields that are used to describe the designs. Each design is given a unique ID and we record the artist who reconstructed the design. Designs are described as Drafts or Plates, Symmetry and Design Elements are identified, and the presence of Line Filler, Framing, and Guide Points are recorded. Completeness refers to how much of the design is based on sherd

evidence, and is assigned greater or less than 50%. The design Scale and Date Reconstructed are recorded if known. References can be added if the design has been used in a publication or other public material. A Notes field allows for the inclusion of any additional information, such as similar designs, and the Rights statement at the bottom displays the CC License for this design.

- What is your opinion of the information displayed here?
- What fields are most important to you?
- What fields could be added?
- What fields would be most useful for filtering results?

Single Sherd Submission:

The purpose here is to test the single sherd functionality (mechanics, ease of use) and usefulness of the sherd metadata fields.

Now we'll test the single sherd submission and discuss the fields used to describe the sherds. Please navigate to the user profile, and then select the "Upload Scan" tab and submit the test sherd (RGB images, 3D scan, and data) that was sent to you. When asked, please do not send the sherd for processing. (observe process)

- What is your opinion of the sherd submission process?
    - Could you rate the simplicity of the process? How could the instructions be clarified? How could the process be improved?
- Please review the record of the single sherd submission. What is your opinion of the record?

    - Is the layout easy to understand? What do you like? What could be improved?
- What information collected about the sherd is most important for your work, and why?
    - What information will you use the most? What information is missing?
- If you were searching for sherds on the World Engraved, what fields would you want to be able to search by and why?

Please return to the View Sherds tab, and find the sherd Fairchilds Landing ID: 189 at the top. Click View Match. The system will present you with several likely matches, and allow you to select the true match if it is there. Please review these results.

- What is your opinion of the matching results?
    - Which result do you think is the true match?
    - Does the result make sense? Is there more information that should be provided?

Batch Sherd Submission:

The purpose here is to test the batch sherd functionality (mechanics, ease of use) and usefulness of the sherd submission template and instructions.

Please navigate to the Batch Upload tab and submit the XLSX sheet and Image Zip file you prepared earlier.

- How did you select sherds for the test batch?
    - What was the reason for selecting these sherds? How do they compare to other sherds in your collection? How many sherds would you like to submit to Snowvision?
- How would you rate the clarity of the scanning instructions?
    - Were the scanning instructions easy to follow? What was easy to complete? What challenges came up during the scanning process? What could be improved?
- How would you rate the clarity of the submission template instructions?
    - Were the explanations of the fields adequate? What issues did you have when entering your data?
    - What was easy to complete? What could be improved?
- What is your opinion of the online submission process?
    - Did you have any issues during the submission process?
    - What was easy to complete? What could be improved?
- Would you prefer to use the single sherd submission or the batch sherd submission?
    - Why would you prefer this option? Could the other option be improved? Would you ever consider using both?

Information Use, Needs, and Sharing

I have some question about your information use and information needs. This will be more of a conversation, and so you can stop sharing your screen for this portion of the interview.

- Could you tell me about your profession?
    - o What is your position? How long have you been in the field? What are some of your responsibilities?
- What kinds of stamped ceramics do you usually work with?
    - o What kind of activities involve you with stamped ceramics?
- What resources do you currently use when looking for information on stamped sherds and designs?
- What archaeological databases do you currently use in your work?
    - What do you like about these data bases?
    - What do you not like about these data bases?
- Please explain how you plan to use Snowvision and World Engraved.
    - What will your primary use be? o What information would be most useful to you?
    - How could the program assist you with collaboration? Student training? Public outreach?
- What kinds of publications, outreach materials, objects, or other miscellany would you produce from the information found at World Engraved?

- If you were able to download the data found in World Engraved, what data would you want to download?
    - What programs and software would you use to manipulate an analyze the data? Would you want to download individual files or all the available data?
- If you were able to download the 3D scans of sherds, what would you use them for?
- What kind of information would you be willing to share in the World Engraved database?
    - Sherds, designs?
- How did you come into possession of the data you would submit?
- Would you want a short-term embargo on the data you submit and why?
    - Should the data be hidden during the embargo, or displayed with a notice about the embargo? How long should the embargo last?
- Do you work with any descendent populations in your archaeological work?
    - What kind of work do you do with them? How would you include them in this project?
- What is your opinion of sherds and vessels from burial context being published in World

  Engraved?
    - How much of your collection comes from burial context? How much of your collection comes from unknown context? What is your

opinion of these materials being available for matching? What are your feelings on these materials being made public online?

- What is your biggest concern about SnowVision/World Engraved?
- Is there anything you think I should have asked, but didn't?