Virtual and Augmented Reality Digital Humanities Institute (V/AR-DHI)

V/AR-DHI was a two-week institute and series of follow-up activities for twelve participants. This project focused on the theory and application of virtual and augmented reality technologies to humanities research. It was hosted by Duke University. The program ran from 2017-2020. The program activities and related materials are documented on http://vardhi.org.

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1. Project Summary

This ongoing project explores the importance of virtual and augmented reality theories, methods, and technologies to humanities research and communications, with an emphasis on historical and cultural representation and analysis, media arts applications, and experience design for virtual and augmented realities. This field of inquiry brings together narrative, archival, data-driven, and spatial approaches to humanistic research in combination with studies of virtual reality, human cognition, experiential learning, and digital storytelling. Physical reconstruction and modeling of architectural sites takes place via physical modeling, digital 3D modeling and printing, virtual worlds, along with representation of historical maps and scenes through GIS, view-shed analysis, and even live re-enactment, as well as fictionalized staging in literature, film etc. All of these approaches share a literalness that assumes that (re)construction and/or immersion will somehow contribute to a deeper understanding of historical events and their contexts. Common questions for the field include: what are the critical questions that inhere in such approaches? What are the historiographical, theoretical, and methodological implications of a virtual and augmented turn in humanistic scholarship? Are there other ways to understand how virtual and augmented places, spaces, and objects can be created, understood, experienced and shared?

2. Project Origins and Goals

Background and Motivating Questions

We came into V/AR-DHI with existing questions around digital humanities in relation to the broader academic enterprise. Both of us are deeply interested in critical approaches to the digital humanities, in theory and in practice, and in the transformation of higher education research, teaching, and outreach taking place in the wake of digital humanities innovation and institutionalization. This project also built upon five-plus years of experience conducting successful, international innovative virtual and augmented reality (VR & AR) workshops through the
“Visualizing Venice” program. In fact, the V/AR-DHI Institute ran concurrently with another institute sponsored by the Getty Foundation, Advanced Topics in Digital Art History: 3D (Geo)Spatial Networks, for which Szabo was the PI, with Co-PIs and partners who overlapped in some instances with this program. This convergence already helped us cultivate the dynamic relationships amongst colleagues interested in both what the digital can do for the disciplines (in the latter case, Art History specifically), and how to understand the medium and its affordances in its own right.

Our over-arching questions included the following:

**What are some ways in which virtual reality and/or augmented reality can benefit humanities research through methods that differ from conventional humanities practices?** We wished to learn this through specific case study examples of research currently underway by scholars in various disciplines, and to abstract from these examples more generalized rubrics for creation and assessment.

**How do the different levels of abstraction and interpretation necessary for any sort of visualization or other transformation affect the meaning produced by these systems?** This question ties to data science practices, metadata content development, and principles of museum communication. We considered these questions in pragmatic and critically-informed registers of inquiry.

**What is the value of virtual reality and/or augmented reality to communication of such research?** What are the best practices for collaborating on such projects? We sought to learn from practitioners in the sciences who are doing this kind of work regularly, as well as consult with humanities scholars who have successfully participated in such projects.

**How can virtual and augmented reality practitioners in the humanities learn from media arts practitioners and scientists engaging in these fields of inquiry and expression?** How are creative uses of not only visual but also auditory, kinesthetic, and sensory modes of expression contributing to the production of new experiences and ideas? We explored this through a diversity of participants’ projects, which integrated these complementary channels of knowing into our collective and collaborative VR/AR experience design.

**How do we know such work is good/useful/important with both the context of VR/AR production and scholarly practice?** We reviewed the literature in the field within the content of virtual and augmented reality as engineering disciplines as well as against the emerging standards for digital humanities scholarship that have been evolving over the last several years through scholarly organizations and other venues.
How can such projects be presented, published, and shared in ways that are consistent with the expectations for peer reviewed publications? We examined various publishing platforms available today and assessed the gaps between what is possible there and what we need to achieve this goal. We also surveyed the various modes of scholarly output employed by participants, and discussed these issues in institute sessions.

What do the arts and humanities contribute to scientific discourse around virtual and augmented reality in terms of theories, aesthetics, politics, cultural impact and social effects? We explored these questions through discussion of demonstration projects, exploration of critical readings, and through our own experiences designing and implementing projects throughout the workshop and over the course of the succeeding year.

Our goals for the V/AR-DHI program in particular were to push the conversation around Virtual and Augmented reality in the humanities further by interrogating the work being done today, reflecting on best practices, and challenges, and looking ahead to what needed to come next for the field. We wanted to learn from how the conversation was developing in different pockets, and to foster communication across subgroups who often felt like they were going it alone and breaking entirely new ground. Building a network and a conversation across disciplines and approaches, became a central goal for our community. Early on, in the process we realized we were facilitating a collaboration with peers, each of whom had something important to contribute to our wide-ranging discussions. We were also aware that a recurring question for digital humanities practitioners is how such work will be evaluated for appointments, promotion, and tenure, where applicable. Virtual and augmented reality seemed to be on the fringe of respectability, even within the ecology of the digital humanities, in some cases, even when otherwise supported financially and institutionally.

Intended Users and Fields of Study

Developing a cross-disciplinary conversation around these topics amongst humanities researchers in different disciplines is critical to the next step of integration of VR and AR into humanities scholarship, teaching, and public outreach. While fields like archeology have inhabited this space for a long time, for other humanities areas these fields are newer terrain. Our team of facilitators included historians, art historians, artists, scientists, engineers, and other collaborators. We were our own audience, with the hopes that our conversations could help seed a broader network of interested parties and collaborators.

An additional impact lies in the capacity to develop conversations between technical and scientific practitioners and the humanities communities interested in this area to promote more effective collaborations going forward. For this reason, one of our goals was to bring a critical media/code studies eye to these conversations. With these objectives in mind, the V/AR-DHI program was
formally co-sponsored by the Franklin Humanities Institute, the Wired! Lab for Digital Art History & Visual Culture, the Information Science + Studies Program, the History Department, and the Duke Immersive Virtual Environment (DiVE) in the Pratt School of Engineering. In creating the Institute, we also drew upon an international network of collaborators from various disciplines and institutions, in part to ensure a wider scope of inquiry, and in part because we knew they would be excellent contributors to the conversation.

As with any introduction of digital humanities methodology into our fields, Interrogating our methods of inquiry themselves - particularly when we are borrowing from other disciplines - is critically important to their legitimacy and effectiveness within humanities contexts. Rather than assuming a halo of scientific validity surrounds our meticulous (though inevitably partial, interested, and flawed) reconstruction efforts, we need to consider our reasons and goals for undertaking these models. Once we acknowledge the partiality and interestedness of these representations as inherent to the enterprise of history-making itself, we are better able to see what they are good for. That was a key focus on this project: to understand what is at stake with VR and AR, both of which were and are enjoying a cultural renaissance thanks to advances in mobile technologies and head mounted displays, and both of which make VR and AR more accessible to a wider range of producers and a potential mass of consumers. They follow on the popularity of video games and derive at least part of their allure from a mixed reality engagement with a magical network supplementing the lived experience of the quotidian reality.

Our expected results centered around empowerment of digital humanists for the exploration and use of virtual and augmented reality technologies on historical (and other types of) research that might benefit from these technologies. This included development of collective awareness of the industry and what is possible today, anticipation of future trends in the field, and clarification of best practices for digital scholarship in the field. We anticipated sharing these insights across multiple channels as the program evolved. Our intended audience was faculty, staff researchers, advanced graduate students, and public humanities professionals interested in developing scholarly and public-facing VR and AR applications to share their research. Emphasis was on the scholarly, academic side of this conversation, though we realized that the museum and heritage communities may also participate as potential partners. While we anticipated that not everyone who participates in the workshop would be a hands-on developer, it was our hope that that deeper understanding of these emergent media forms will come of having worked actively with them on technical, methodological, and critical registers.

Past Work

As collaborators, the facilitator team had had experience working with Virtual Reality and Games in various curricular and artistic initiatives, including our interdisciplinary humanities labs at the John Hope Franklin Humanities Institute. The project co-Directors had both co-directed
interdisciplinary labs that touched upon these topics in the past - the GreaterThanGames: Transmedia Applications, Virtual Worlds, and Digital Storytelling Lab (Szabo), and the Border/Work(s) Lab (Stern) - and were currently co-leading the PhD Lab in Digital Knowledge, a lab for graduate students organized under the Digital Humanities Initiative at FHI. Szabo is also a partner in the Wired Lab for Digital Art History & Visual Culture, and Chair of the ACM SIGGRAPH Digital Arts Community. She holds a special interest in augmented reality, digital heritage, and immersive media, as well as in the histories and cultures of new media. Stern is an historian with longstanding interests in critical cartography as it relates to early modern empire. He was also the recipient of a Mellon Foundation New Directions Fellowship, with a focus on applying spatial theory and data and digital historical visualization to the history of empires, and continues to lead conversations in History around emerging methods and best practices.

We had engaged in various workshops and institutes of various stripes over the years, and knew the Institute structure could be a fruitful approach to fostering the cross-disciplinary conversations we wanted to have. Over several years the Kress and Getty Foundations had supported the Visualizing Venice two-week, international workshops hosted at Venice International University, and produced in collaboration with colleagues from IUAV Architectural University in Venice and the University of Padova Engineering program. Many of the V/AR-DHI collaborators had co-organized and taught in these workshops, some of which were more targeted at beginners and graduate students, while others were more advanced. http://www.dukewired.org/workshops/. Over their five-year history, the Visualizing Venice workshops had focused specifically on digital art and architectural history and urbanism, using Venice as a case-study example, and have included modules introducing databases, mapping, photogrammetry, 3d modeling, video, and augmented reality. These workshops took place over five summers, from 2011-16, serving as introductory workshops for graduate students and young scholars interested in developing knowledge in the field from a combination of scholars, media specialists, and scientists. As noted earlier, the group reconvened around advanced topics in digital mapping and information systems for digital art history specifically, in keeping with the Getty Institute’s focus on internationalization and advanced art history topics. In addition, in Summer 2017 Duke University also partnered the National Humanities Center on a workshop focused on Object, Places and the Digital Humanities. One of our facilitators (Olson) was a co-lead on that program. http://nationalhumanitiescenter.org/digital-humanities/.

This advanced workshop in the USA, by contrast with these other art historical examples organized largely abroad, provided an opportunity for some of the collaborators on the Venice workshop, alongside other local experts in VR and in collaboration with other stateside participants, to draw upon Duke’s existing resources to pursue an intensive exploration of virtual and augmented reality in a broader frame, to include archeological, literary, historical, cultural, and critical/creative applications of these technologies. Doing this work in the US context, at home at Duke, enabled us to draw upon the instructional and evaluation resources necessary to help us move the field forward in a US context, including, in our case, through our own MA in Digital Art.
3. Project Activities, Team, & Participants

Concrete Activities

We conducted a formal institute in Summer 2018, as planned, at Duke University, over a two week period. We also held a follow-up meeting in February 2020, with several related activities scheduled over the grant period.

We held the Virtual and Augmented Reality Digital Humanities Institute at Duke University from Monday, July 23, 2018 to Friday, August 3, 2018. Applicants applied with individual projects, and included a variety of disciplinary backgrounds. After determining the participants, we decided to organize the sessions around a few key themes:

- Reconstruction and Reproduction: Reconstructing and Interrogating the Material World
- Interactive Storytelling: Immersive Education and Knowledge Production.
- Media/Art/Experience: Immersive Media and Performance; Multimodality and Experience Design.
- Data/Archives/History: Data Visualization in 3D; Scholarly Futures.

These themes emerged directly out of the proposals and reflected intellectual directions for extended reality research beyond what was expected.

The schedule for each “unit” revolved around a few key elements: critical readings, participant project demonstrations, follow-up discussions, and meta-conversations around the impact of this work on the relevant disciplines. We also scheduled some technology demo sessions by Duke faculty and staff, along with site visits to various labs and facilities, throughout the two weeks. We had anticipated doing more teaching of technical topics during the sessions, but found that the group was so diverse that it was hard to identify areas of common interest for this kind of hands-on tutorial work. Instead, smaller groups of people broke off and shared ideas during non-scheduled times at the ends of the days and in the evenings.

We also determined that although everyone had different objectives, the whole group shared concerns about where virtual and augmented reality fit in academic evaluation standards, whether they came from more academic or artistic disciplinary homes. This topic seemed to come up daily, and has ended up being one of the main areas we plan to organize our white paper around. We are
building upon the work done at a Scholarly Communications Institute on this topic a few years ago, and plan to share our conclusions as an online report that we hope will be usable for APT committees as an appendix to Guidelines published by the Modern Language Association, the College Art Association, the American Historical Association etc. The Full Schedule of the Institute also appears on our website: https://sites.duke.edu/vardhi/summer-institute/schedule/

Timeline of Activities

We kept to our initial timeline for the main Institute. The follow-up meeting was more challenging to manage. We had initially intended to meet up only with the facilitator group in the second year, in order to reflect upon our experiences and plan follow-up activities. However, it emerged that one of the most important outcomes of the institute was fostering and maintaining connections amongst the participants. Therefore, we planned for a group "reunion" in year two. An initially planned reunion gathering for April 2019 had to be postponed due to storms in the Northeast that led to the cancellation or significant delay of almost all participants' flights. We then planned for an October 2019 at the University of Virginia (institutional home to two Institute participants), so that had to be rescheduled again. We finally reconvened in February 2020 for a session at Duke that became part of Duke’s "XR Week." At that time, we received project updates and focused on our shared deliverable: XR evaluation standards.

Initial Plan:

- **Year 1**: 2 week workshop with 12 participants (2 local and 10 travelers)
- **Follow-up sessions**: Online community postings with follow-up project reports expected in September 2018, with quarterly updates via videoconferencing, and with final updates in May 2019.
- **Year 2**: 1 week follow-up session amongst instructors to aggregate lessons learned and compile final white paper report and online resources -

Actual Activities:

- **Monday, July 23, 2018 to Friday, August 3, 2018** - Initial Institute at Duke University - https://sites.duke.edu/vardhi/summer-institute/schedule/
- **Summer 2019** - Facilitator discussions around interdisciplinary Evaluation Guidelines
- **Summer 2020** - Facilitator review and website updates and documentation; graduate student workers compiled extended bibliographies on XR resources for pedagogy - https://sites.duke.edu/vardhi/2020/08/30/virtual-and-augmented-reality-literature-review/
Related Activities with V/AR-DHI Participants:

- **June 2018** - Advanced Topics in Digital Art History: 3D (Geo)Spatial Networks Year 1 meeting - [http://dahvenice2018.org](http://dahvenice2018.org)
- **September 2018** - Updated Version of Sylvia’s List on XR Publication opportunities - [https://sites.duke.edu/vardhi/2018/10/01/xr-publications/](https://sites.duke.edu/vardhi/2018/10/01/xr-publications/)
- **Spring 2019** - Launch of the “XR Studio” space at Duke to facilitate local discussion - [https://cmac.duke.edu/labs/cmac-xr-studio](https://cmac.duke.edu/labs/cmac-xr-studio)
- **June 2019** - Advanced Topics in Digital Art History: 3D (Geo)Spatial Networks Year 2 meeting - [http://dahvenice2018.org](http://dahvenice2018.org)
- **July 2019** – Szabo presents at the Associated Colleges of the Midwest VR Pedagogy Workshop on “Beyond Annotation (or Pokemon or Zombies) in Urban AR” - [https://sites.duke.edu/vardhi/2019/07/28/var-grinnell/](https://sites.duke.edu/vardhi/2019/07/28/var-grinnell/)
- **May 2020** - Special Issue of the Journal of Interactive Technology and Pedagogy on “The Potential of Extended Reality: Teaching and Learning in Virtual Spaces” appears (Szabo as co-editor) - [https://jitp.commons.gc.cuny.edu/category/issues/issue-seventeen/](https://jitp.commons.gc.cuny.edu/category/issues/issue-seventeen/)
- **November 2020** – successful funding of Johnson C. Smith’s proposal to the National Archives for an augmented reality exploration of historic Charlotte. The project is supported by several V-AR/DHI facilitator partners. [https://sites.duke.edu/vardhi/2020/12/01/jcsu-partnership/](https://sites.duke.edu/vardhi/2020/12/01/jcsu-partnership/)
January 2021 - Szabo receives word that an essay on “Evaluating XR: Standards for an Emerging DH Medium,” which grew directly out of the V/AR-DHI institute discussions, will appear in *Digital Scholarship in the Humanities*

February 2021 - ACM SIGGRAPH SPARKS discussion organized by Szabo and a collaborator around Immersion, Interactivity and Altered Realities features V/AR-DHI participant - https://dac.siggraph.org/sparks-immersion/

A number of our participants have also continued to do presentations on related subjects, and to stay in touch around shared interests, develop emerging projects, etc. as they evolve. Though significantly disrupted by the COVID-19 crisis, we continue to connect around possible future joint publications, both online in relation to the Evaluation Standards topic, and in an edited volume focused on principles and methods, as well.

Institute Planning and Recruitment

We planned the institute drawing upon our experience with a wide range of collaborators. We advertised the Institute through our social media and professional channels in addition to relying upon the NEH website.

The participants were selected from a group who apply via an online Qualtrics form designed for that purpose. They were asked to write a short essay describing their interest in the program, potential project applications, and technical and academic background relevant to the workshop. They also needed to submit a CV. The expectation was that workshop participants can demonstrate a basic level of digital humanities competency, as reflected by experience working on websites, HGIS, multimedia production, text analysis, or active engagement with other tools and resources. They needed to be able to explain how this workshop would further their own research, and demonstrate a commitment to sustained inquiry online pre- and post-workshop.

The workshop was advertised through the Humanist mailing list, on the MLA discussion boards, and on social media (Facebook and Twitter), via the HASTAC site, and through various other professional organization mailing lists and blogs. It was advertised through flyers distributed at CAA, AHA, MLA and related professional organizations. The target audience was faculty in the humanities, though advanced graduate students, librarians, digital humanities specialists, and related researchers could also be considered. In order to keep the group relatively focused on humanities concerns, we wanted to bring in members of the humanities community rather than including technologists and scientists. Those perspectives were represented amongst our instructional staff and guest lecturers. This was a good choice; we already had such diversity of approaches that this would have made our particular gathering untenable. We anticipated the following:
Graduate students interested in the field as future research working on humanities topics that might benefit from this approach and have some foundational knowledge

• Independent artists and developers interested in developing VR/AR skills for their craft

• Publishers wanting to learn more about this emergent direction for humanities research

• Possible research outputs considered would be online publications, kiosk based experiences, mixed reality exhibitions, and apps. Therefore, we will look for participants who demonstrate they might be able to contribute effectively to that mix.

This list proved to be fairly representative of our final group. Once we had gotten our initial institute proposals, our goal was to pull together a group of experienced practitioners so we could share ideas across disciplines. We solicited initial feedback about the applications from our community of facilitators, before selecting the final participants. We also made the decision to include some local participants who had expressed interest, as they could contribute to the conversation in different ways form the external applicants.

As noted above, we organized the participants into key themes. These themes emerged directly out of the proposals and reflected intellectual directions for extended reality research beyond what was expected. Once we had done that, it became easier to determine the structure and focal points of the session.

One challenge in planning an Institute of this type is that you do not know who you will get as participants. We decided early on to focus less on hands-on how-to technological sessions, though we left time in the schedule for peer instruction, in favor of insider project-sharing, demos, and critical conversations around core issues. This turned out to be a wise and generative choice. This meant there were no real "boot camp“ sessions taking place, which might have been a little disappointing, but we did get to try out a lot of different kinds of projects and to talk about their relative affordances. We also held option lab sessions and left spaces open for ad-hoc meetings and demos, which were taken up throughout the two weeks of the Institute. A couple of participants also took the time to visit the Nasher Museum to learn more about the eye tracking technologies they were exploring. Our participants agreed that what couldn't be reproduced in another context was the project-sharing, community, and “workshopping” of ideas that took place together.

Social, Technical and Institutional Challenges

We initially imagined that the Institute would include both hands-on instructional activities and active project sharing. We came to realize that we would be dealing with participants from a wide range of disciplines but also with very different conceptions of what constituted XR. One positive outcome of this was that we did not have as much pressure for everyone to have access to all the different technologies. However, we did pay extra to ship some equipment for participants for the demonstration sessions. It was important to us that our participants be able to experience any
projects we were discussing “first hand,” using the technologies with which they were produced whenever possible. This meant some last-minute excitement around getting systems to work. We were fortunate to have collaborators from our central IT organization and from the Pratt Engineering school to help smooth the way in these areas and help make these aspects of the program successful.

As the Institute was held over the summer, it was inevitable that some of the faculty interlocutors we would have liked to have participated were not available to join our discussion. We had one person accept who had to bow out later, which made space for more local engagements.

We were very grateful to have the formal presentations and informal time for question and answer with our international collaborator from Italy. They were experts in Historic Building Information Modeling and virtual reality for cultural heritage, as there was no substitute for first-hand exposure to the projects and follow up connections and sharing. They were key to our ability to present high level scientific principles and ideas, to discuss the realities of interdisciplinary collaboration, and to look ahead to areas for future research.

We were also able to bring in some speakers by videoconference (Zoom), notably around the subject of language learning with VR. In retrospect, we could have done more of this kind of integration, although that remains an issue for sharing technologies that are inherently immersive and technology-specific.

Project Management, Collaboration, and Labor Challenges

We did not have any major project management and collaboration challenges. We did do some shifting around of responsibilities early on, realizing that some work we had anticipated happening before the Institute around getting participant materials together would end up happening closer to the time of the Institute itself. This was due to a variety of factors: the nature pressures of the academic calendar, the desire of participants to share the latest versions of their work, and various other logistical and administrative hurdles.

One other “issue” that came up was that there was not always a clear boundary between those we were inviting in as respondents or interlocutors and those who were meant to formally participate and facilitators in the program. This was not actually a problem, but more of an opportunity to learn from each other on multiple levels. The only challenge here would be in thinking ahead to if, when, and how to allocate honoraria for substantive engagements. The distinction we ended up making was between formal presentations, which would require advance work, and informal feedback, which could happen in real time.

An additional issue, and one that will likely recur, arose with staff contributors who made substantive contributions to the program. Due to institutional rules, it is difficult to allow them
extra pay if the work is similar to their existing job descriptions, and we had to justify it as extraordinary effort (rather than simply a buyout of time), and in one case, shift our funding plans so we could offer research and equipment support instead. This structural barrier could have a chilling effect on faculty-staff collaboration going forward, especially in cases where the staff involved are not part of our core project teams, as they are with us, but rather are truly taking this on as an entirely separate venture. On the other hand, there is a sense in which we regard having experienced this added challenge to collaboration — often central to digital humanities projects and to XR projects in particular — as another substantive and productive finding of the Institute undertaking.

Quantitative Outcome - Participants and Facilitators

We had 12 participants total, as noted above. 10 were external, and 2 were local to Duke. We also had a number of external facilitators, including three international collaborators, who contributed substantially to the program in various ways. The list of participants, facilitators, and partners is below

Final Participant List

Note: project titles and affiliations of participants and affiliates reflect their positions and locations at the time of the Institute’s implementation in 2018.

Selected Participants:

- **Shane Denson**, Assistant Professor of Film & Media Studies, Stanford University, "Post-Cinematic Interfaces"
- **Tahir Hemphill**, Papamarkou Chair in Education at the John W. Kluge Center, Library of Congress, "Mapper’s Delight"
- **Mona Kasra**, Assistant Professor of Digital Media Design, University of Virginia, "Immersive Media: Performance, Experience, & Audience"
- **Micki Kaufman**, Doctoral candidate, CUNY Graduate Center, "Quantifying Kissinger"
- **Fotini Kondyli**, Assistant Professor of Byzantine Art & Archaeology, McIntire Department of Art, University of Virginia, "Inhabiting Byzantine Athens"
- **Lynn Ramey**, Professor, Vanderbilt University, "Storytelling in the Medieval Mediterranean"
- **Kathleen M Ryan**, Associate Professor, University of Colorado Boulder, "Engaging Photojournalism and Environmental Knowledge: Immersive Technologies and an Ethic of Care"
- **Margaret Schedel**, Associate Professor of Music and Digital Media, Stony Brook University, "Háček"
- **Filippo Screpanti**, Ph.D. candidate in Romance Studies, Duke University, "V/AR and Second Language Acquisition"
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Co-Project Director: Philip J. Stern, Duke University
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- John Shelton, IT-Analyst, Duke University, "A Faux Time Machine"
- Justin Underhill, Mellon Postdoctoral Fellow, Digital Humanities, University of California, Berkeley, "California Museum Resources in VR"

Directors:
- Victoria Szabo, Project Director
- Philip T. Stern, Project Co-Director

Facilitators:
- Paolo Borin, PhD Student, Department of Architecture and Arts, Università Iuav di Venezia
- Hannah Jacobs, Digital Humanities Specialist, Wired Lab for Digital Art History & Visual Culture, Duke University
- Regis Kopper, Assistant Research Professor, Mechanical Engineering and Materials Science, Director of the Duke Immersive Virtual Environment, Duke University
- Sylvia K Miller, Program Coordinator, John Hope Franklin Humanities Institute, Duke University
- Cosimo Monteleone, Researcher, Dipartimento di Ingegneria Civile, Edile e Ambientale (ICEA), University of Padua
- Mark Olson, Laverack Family Assistant Professor, Art, Art History & Visual Studies, Co-Director of the Speculative Sensation Lab and Wired Lab member, Duke University
- Amanda Starling-Gould, Franklin Humanities Institute
- Edward Triplett, Lecturing Fellow, Art, Art History & Visual Studies and Wired Lab member, Duke University
- David Zielinski, Research and Development Engineer, Pratt School of Engineering, Duke University

Additional Presenters and Respondents:
- Matthew Kenney, Information Technology Analyst, Duke University
- Aaron Kutnick, Instructor, Duke University
- Augustus Wendell, Assistant Professor of the Practice, Duke University
- Paul Jaskot, Professor, Art History and Visual Studies
- Sheila Dillon, Professor, Art, Art History & Visual Studies, Duke University
- Annabel Wharton, Professor, Art, Art History & Visual Studies, Duke University
- Maha Houssami, Lecturer, Asian and Middle Eastern Studies, Duke University

Graduate Assistants:
- Vijay Rajkumar, MA Student, Computational Media
- Rosalind Russell, PhD Student, History
- Avrati Bhatnagar, PhD Student, History
Disciplinary and Methodological Ranges Represented

Disciplines Represented:

- Art History
- Archeology
- History
- Journalism
- Languages
- Literature
- Media Arts
- Music
- Scientific Visualization
- Computer Science
- Architectural Engineering

Range of Use Cases:

- Historical Reconstruction
- Cultural Heritage Apps
- Digital Storytelling
- Language Instruction
- Representation of fictive spaces
- Media performance
- Archival and data aggregation and visualization

VR/AR (XR) Technologies Considered:

- 3D models of buildings, objects and landscapes
- 360 video
- abstract data visualizations
- media installations
- source material and annotations
- immersive CAVE spaces
- high- and low-end headsets
Cardboards and mobile devices
- Websites and 2D screens
- iOT devices and haptics

4. Project Outcomes

Final Products and Outcomes

The final products and outcomes of this Institute took several forms. On a formal level, we can cite the initial two-week institute, the follow-up gathering, our various other gatherings and conference panels, and the final essay to be published in DSH around Evaluation Standards for XR. The ripple effects of the Institute are much greater, however. We also still hope to put together an addendum to the DSH journal article around evaluating digital scholarship, and have had preliminary discussions with a publisher around an edited volume. While our development timeline has slowed, it hasn’t stopped. We have also realized new avenues for exploration in light of the COVID-19 crisis, particularly around Social VR and can imagine extending work in that direction.

Technical Decisions

We decided to limit the technical instruction that would take place hands-on at the institute. We were fortunate to be able to meet in the Wired Lab at Duke, where we did have access to computers. was also adjacent to the ISS Lab, where we had set up some equipment for shared access. These labs include 16 total Mac workstations, 5 PC workstations, several Oculus headsets, and an HTC VIVE. We also had a motion capture suit we used for demonstrations.

We held other sessions at the John Hope Franklin Humanities Institute, where there was more space for installation-based exhibitions. This is an important note for immersive performance- you need a tracked space.

One of the choices we made was to bring the group to a downtown center called Augmentality, which makes a wide range of VR headsets and games in tracked spaces available for game parties and gatherings. This was a great way to expose everyone to the possibilities for the medium, as well as a fun way to get to know each other. We also visited our 6-sided CAVE, the Duke Immersive Virtual Experience. As it turned out, that was just before DiVE was defunded and retired by Duke's Pratt School of Engineering, a decision made in light of the evolving nature of VR applications and equipment. (Yet another challenge that also indicates a finding, as VR and AR work is often subject to shifting platforms and media, as delivery modes shift from large, expensive “cave”-like experiences to more portable device-based experiences, such as headsets and mobile phones).
Our central IT organization was able to demonstrate some equipment in their dedicated greenscreen room as well. Having access to these spaces made it very important to us to be able to host this institute at our own institution, but it also highlighted the limitations others will encounter if they don’t have access to these kinds of resources and staff.

Documentation, Access, Copyright Issues

One of the challenges of virtual and augmented reality is that it is difficult to document experience directly. We can document people using devices, and we can screenshot media prepared for the devices, or watch a confidence monitor as one experiences it, but it is difficult to be co-present in VR. Derivative media plus explanatory text may be the way to share this kind of work, far into the future, as we have continued to see with other forms of digital humanities authorship.

This lack of access to at least the lived experience of XR may change somewhat with the growth of multi user, social VR spaces, and with the development of multiplayer game environments relying upon common authoring platforms like Unity and Unreal, in the coming years. This may be an emerging area for consideration for research and institute exploration. XR continues to have a number of barriers to access, however. There are issues around interface and accessibility, digital divide issues around access to technology authorship and equipment and concerns about the longevity of what is created that ties to the rapid turnover of technology. There is much to be said for creating multiple interfaces to a single set of materials, or iterative approaches to projects that allow for different points of access. While we have made some progress in thinking about what standard for evaluation XR may look like, these are only first steps and do not resolve the larger questions around whether, when, and how such work may “count” in academic settings. The high risk/questionable reward for exploration remains an issue.

Nonetheless, we do see some movement forward in some areas, like the evolution of 360 imaging and video for documentary and other purposes. These are part of the XR continuum and may represent bridge cases that make it possible to think ways into the field that also do not require intensive amounts of digital asset content creation.

Personal and Professional Outcomes

In our own careers we have seen this focus result in additional opportunities, as noted, for example, in Stern and Triplett’s NEH ODH Phase II and Duke internal project grant, and in other proposals underway. Szabo and Monteleone (Italian collaborator) are building on their experiences with this project to launch a new project visualizing literature on site and on location, starting with HP Lovecraft, and taking advantage of some of the ideas that arouse around creative use of XR at the Institute. They are also extending this work into other Visualizing Cities projects associated with that ongoing collaboration. As these projects suggest, we will continue to work with the medium, and to continue the discussions launched through the V/AR-DHI project. In addition to the work
the Project Directors have done, we are seeing ripple effects amongst the contributors, as demonstrated in their conference presentations, exhibitions, publications, and performances. Some of that work is documented here, and on the project website.

We also continue to work with our broader community around new institutes and collaborations. Duke’s Game Lab also includes some of the V/ARD-DHI community members, and is drawing in more faculty from fields such as Psychology and Neuroscience, Second Language Acquisition, and Computer Science and staff from Occupational Health and Safety, the Office of Information Technology, among others all of whom share an interest in both gaming and in VR.

5. Project Evaluation and Impact

Logistics and Feedback

We asked for feedback from our group in person at the end of our session, and also through a feedback form that allowed for anonymous responses. Most of our participants were not shy about giving us first-hand feedback. Because we treated everyone as co-producers of the experience there was less of a sense of being “evaluated” so much as working together to come to common solutions. We considered it a sign of success that our participants wanted to reconvene in ways we hadn’t planned at first, and that they have continued to stay connected and share with one another.

We were able to house everyone in a hotel across the street from our workplace. This made it very easy to come and go throughout the week, and we would encourage future organizers to think about the whole experience of being on-site, especially for an institute of longer duration, in terms of formal and informal sharing and collaboration spaces. That said, we learned from a few participants, however, that they wanted the option to be able to secure other types of housing, and some wanted to return home on weekends, so we decided to offer a flat rate of support for housing in lieu of paying directly for hotels, in some cases. We also needed to be attentive to the dietary needs of our group, and organized catering options that included vegan and gluten-free choices and snacks. In addition, we worked to ensure that in our work and social spaces we had access to gender-neutral restrooms, and ensured there were options for transportation and building access for those with limited mobility. These proactive steps helped to create a flexible and comfortable home base for everyone.

One piece of feedback we got after the Institute was that our schedule was very intense. We had originally planned for open lab sessions scheduled for the end of each day, but by about 4pm everyone was ready for a break, so we made the lab sessions entirely optional and ad hoc. Participants formed a tight group and had dinner together in the evenings, where they build additional bonds with one another. Ultimately, we consider the network of fellow travelers that was created through this institute one of our most important outcomes.
What Did We Learn? Lessons for Future Project Directors

Lessons learned have mainly been stated above, to but summarize:

**Inevitable Complexity and Heterogeneity**: An advanced institute about new technology means that everyone is simultaneously a novice on something, and an expert on something. The challenge is to figure out how to share and exchange ideas.

**Disciplinary specificity is real**, and will remain a feature going forward. While the underlying affordances of XR may depend upon the technology, how it gets used varies tremendously based on the specifics of the choices and how they are implemented. This is not a surprise, but it does suggest that as we think about questions like Evaluation Standards we will need to circle back to the disciplines: XR for History; XR for Journalism, etc. hearkening back to our prior categories and/or creating new ones.

**Pedagogy** is a way into a lot of this conversation. It provides an opportunity-space for mutual exploration. Just as we learned from each other in the institute, we often find that working with students we begin to appreciate what is possible and valuable in the field. It also lowers the stakes in terms of professional consequences if you think about doing a unit where you try out the tech as one of many elements in a DH-enriched classroom, rather than trying to hang everything on that intervention from the start. Several of the follow-up projects and conversations Szabo has been involved with have centered around this area. Similarly, there is strong overlap between the VR/AR and game space communities around exhibition, performance, and immersive interaction, all of which could be areas for future development.

**Scheduling** is hard, and space is complex, but **co-presence in a time and place** is critical for engagement. While online experiences and gatherings can be a great supplement, they do not substitute for the complete “immersion” of co-location.

**Institutional barriers and rules** concerning compensation and time allocation, especially when they concern collaboration with staff, contingent or contract faculty, and students, are very real and substantive issues that affect the quality, duration, and potential of VR/AR (and DH more broadly) projects, especially on long time-horizons. This was a finding made directly by our own experience in planning and executing the Institute, as well as indirectly, as the issue was raised by many of our contributors and collaborators in describing their own project development process. Part of the success of our institute was the direct result of our ongoing relationships with our academic programs (humanities, social sciences, and sciences/engineering), interdisciplinary labs, library, IT, and museum connections. Each of those spaces is exploring their own iterations of the digital humanities, and virtual and augmented reality in particular benefits from a multi-pronged
approach. Szabo wrote about this topic as part of a recent CLIR Foundation report (2019), as noted above.

All conversations about digital humanities inevitably swerve towards the Evaluation Standards question. It was true with this group, and has been true with other institutes. Until faculty and graduate students (and the staff who work with them) feel legitimized in doing this research, it will proceed in fits and starts, and perhaps end up in a lot of effort with little to show for it. We have the opportunity to lower the barriers with new technologies of production and circulation, but these often rely upon commercial systems and access to resources that may be short term, not scalable, or outmoded quickly. It is incumbent upon us to think through where the value is in this kind of exploration, and how we can join us with our partners on the other side of campus. There are great opportunities for true “STEAM” partnerships where the A (or silent H) isn’t just a modifier of STEM, but rather the two sides are mutually constitutive. We have found that by working with our colleagues in computer science and engineering in a focused, project-based way, we are able to create interesting work that serves the needs of both parties, at least some of the time.

Ongoing collaboration continues to be a challenge across disciplinary and practical boundaries. One thing that we have not yet succeeded in doing is deciding if there really is a way for all of us to contribute to one project together. Which interventions should be generalized around the affordances of the medium, and which are more specific to ongoing disciplinary discussions? We had various ideas for different types of publications we might put together, but in the end, it seemed like our interests were either in publishing in the venues we would already use within our own disciplines rather than in creating some third space that would “scoop” us on our own work. However, we still feel there is space for collective reflection on the medium itself, and hope to find a way to move forward with a mix of V/AR-DHI participants and others in future work in the area.

6. Project Continuation and Long-Term Impact

Continuing Work and Next Steps

Despite the constraints noted above, still have hopes of co-authoring a website and possible further publication around elaborating the Evaluation Standards for XR, within the limits noted above. The Digital Scholarship in the Humanities essay that will come out this year is just a first step. This expanded work will likely involve a mix of V/AR-DHI and other contributors, though we may also host a reunion convening to gather ideas and input. We can see contributors from the Getty Institute on Digital Art History being likely partners in a more focused project tied to digital heritage and virtuality as well.
Future Funding

Individuals involved in V/AR-DHI continue to pursue research projects on their own. We may wish to pursue funding to support a digital publication around V/AR-DHI topics and their documentation in a multimodal fashion. This would serve as a complement to a text-based (i.e., print) publication.

Another topic for future Institute support might relate to sociality and virtuality in the post-COVID-19 era. See below.

One topic of note: the *Digital Scholarship in the Humanities* essay is in a hybrid publication, which means it is not eligible for Open Access funding support from our home institution. Looking ahead, it would be prudent to factor in such considerations into future funding structures.

New Research Questions

The COVID-19 crisis has changed some of our longer-term vision for the project, as noted above. For one, we are seeing a growing interest in virtual events and experiences online, an area that was not really part of our initial visual except in terms of art and performance contexts. All of us are thinking through how we can supplement or complement the other kinds of synchronous online experiences made possible through webinar and video conferencing tools for teaching and research. We anticipate renewed interest in platforms like Second Life and its successors, and a need to remember the experiments of times past as we look at the latest iterations of these technologies, in addition to the usual interest in HMDs and other higher tech approaches to XR, and game-engines as authoring sites, and are looking at how platforms like AltSpace and Mozilla Hubs can contribute to this expanded ecosystem of virtual and hybrid community-building.

Other projects have continued on their prior trajectories, but with added insights gleaned from the V/AR-DHI experience. Szabo is especially interested in Augmented Reality on site and on location, which will become part of the Visualizing Lovecraft/Visualizing Cities project noted above. She recently also wrote an essay on Urban AR for an upcoming volume from Routledge that focuses specifically on mobile experiences; as with virtual worlds; we see this as a growing, and comparatively lower-tech, area for development, with the community interested in those topics overlapping profitably with this one as well. Looking ahead, we could imagine a potential future Institute that would address some of these evolving questions.

Also as mentioned above, Stern has joined with Triplett, to some extent as a result of the V/AR-DHI experience, to develop the NEH/ODH and Duke funded “Sandcastle Workflow” and “Mapping History” project, which seeks to develop a methodology for 3D visualizations of historical cartography, ultimately using procedural modeling and game engine platforms with potentially significant implications for the use of XR in urban, architectural, and cartographic history and the humanities, among other fields.
As these developments suggest, further overlap with the Game Studies community around interactive and immersive experience design, the potential for non-linear narrative and spatialized analysis are all potential growth areas. Interactive, hybrid, and virtual performances will increasingly also include context-driven elements and databases of changing information. With the advent of open-world game platforms that aspire towards pedagogical use, there will be additional opportunities to work within and across these overlapping communities. In addition to being a member of the Wired Lab for Digital Art History & Visual Culture, Szabo is the co-director of the Duke Game Lab, which strives to bring a critical dimension to these questions in terms of production, consumption, circulation, and access; several of our facilitators continue to participate in this conversation around platforms and infrastructure as well. The use of Unity, Unreal, and web-based systems for VR/AR also extends to GIS-based and locative media generation and cross-overs. Generative, collaboratively authored and consumed VR/AR experiences are areas of potential interest here as well. Emerging opportunities in AI for content generation, recommendations, and NPC interactions will provide areas for future research as well.

On the other side of the equation, throughout all of this work, we are aware of the differential access to the tools for VR/AR creation and consumption, the limited shelf-life of these productions, and the ways in which a rush to these systems may be at the expense of critical reflection on whether such interventions are appropriate. The COVID crisis has only highlighted the extent to which computing access is not equally distributed, even amongst our own faculty, staff, and students within individual institutions. As with all DH projects, questions around ethics, authority, and power relations will continue to need attention. As new partnerships, for example with regional institutions and community organizations take shape, we will need to think about longer-term sustainability and documentation in ways that benefit all of our partners. We may wish to delve into minimal computing and web-based XR approaches for future work as well.

Our extended group at Duke was recently part of a successful project proposal to the National Archives from Johnson C. Smith College, an HBCU with which Duke has historic connections, around online exhibit on the effects of urban renewal in African American neighborhoods in Charlotte, North Carolina. This augmented reality project will draw upon historical materials and will need to be constructed in such a way as to be locally sustainable. We would also like to connect this conversation with the ongoing work of the NCCU-Duke Digital Humanities Faculty Fellows program. This program was created with the support of the Mellon Foundation and was designed to support a partnership between NCCU as an HBCU and Duke as a well-resourced R1, to explore digital humanities pedagogy and research. While many of the projects undertaken by the group so far have been focused on web-based pedagogical interventions and outreach, we see XR as an emerging area of interest for our ongoing group. [https://sites.fhi.duke.edu/nccudhfellows/]
Maintaining Connections

Our expanding network has already been a generative force for many of us; we only see that continuing in the coming years. We have maintained connections with the Institute community through email, social media, etc. We have found gathering our core group and related colleagues at conferences to be an effective strategy thus far, although we do not know yet if this will continue to be viable now that the grant period has ended. Adding to the challenge, some conferences, such as the annual international DH conference, where we had hoped to reconvene, are on hold. However, we will continue to reach out to members of this group to share ideas and opportunities as the field evolves, and we would still like to mount the deferred gathering at the University of Virginia if time and resources allow. A future Institute or event at Duke would also be a desirable outcome.

Acknowledgements

One final note: the John Hope Franklin Humanities Institute and the Wired Lab for Digital Art History & Visual Culture were especially important partners in this endeavor. The FHI provided a home base and point of connection for critical conversation and outreach in this field. As the co-sponsor of the Computational Media, Arts & Culture PhD program, and the longtime supporter of many of our interdisciplinary labs, FHI has been instrumental to our success in hosting and managing this project. Our thanks go to the FHI leadership who made this project possible, and to the staff partners who helped organize the discussions around scholarly recognition and future directions for publication. They were important contributors to the overall conversation, and to the project as a whole.

The Wired Lab for Digital Art History & Visual Culture in the Department of Art, Art History & Visual Studies has also been an essential partner, fostering a community of like-minded scholars, technologists, and media practitioners who are endeavoring to understand the impact of the new technologies in the disciplines, as well as in their own right. Thanks to these connections, and together with the other Computational Media, Arts & Cultures labs, we were able to leverage our longstanding work with Wired to extend the conversation in new directions, and to bring in faculty and staff facilitators from Duke and beyond. These relationships have helped to ensure a truly cross-disciplinary experience, and one that was attention to emerging trends outside of our own home institutions.

Special thanks also to the Department of History for its ongoing support, and to the staff of the Duke Libraries, the Office of Information Technology, and the Nasher Museum for their contributions to the project. We are aware that any major shifts in how academic research and practice in the humanities takes place will need the guidance and support of a wide range of institutional collaborators, and we are grateful to have had the opportunity to develop this project within that broader framework. We are also grateful to the other colleagues beyond the formal V/AR-DHI group whom we have met and learned from over the past several years, both in person and online.
Building a network was one of our most important project outcomes, and we look forward to continuing our conversations with you all.

Finally, thanks to the graduate and undergraduate students who are helping us explore these new frontiers in digital humanities, and who will carry forward lessons learned in extending our realities into their own lives and work in the coming years.

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