PROPOSAL for an Interdisciplinary, Interdepartmental

PhD in Computational Media, Arts & Cultures

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I. EXECUTIVE SUMMARY

This proposal is for an interdisciplinary, interdepartmental PhD in Computational Media, Arts & Cultures. It is supported by the Department of Art, Art History & Visual Studies, the Program in Literature, the Information Science + Studies Graduate Certificate Program, and the Franklin Humanities Institute. It has been endorsed by many senior administrators, faculty and staff from around campus. The Mellon Foundation provided programmatic startup and endowment funds for the program. These funds were matched by the Graduate School and Trinity. Current resources will support 3 new lines over 5 years. Funds for additional lines will come from Computational Media MA revenues, partner contributions, grants, and targeted development.

The Ph.D. program is meant to be small, experimental, and interdisciplinary. Its focus is on the intersection of media arts and humanities, sciences, and technology, both in theory and in practice. At the core of the proposal is the computational revolution, and its implications for how we live, think, work, create, and communicate within and across various disciplines. Rather than being the purview of any one discipline, the study and creation of computational media is part of many. Critical engagement with the global, social and cultural impact of computational media is a central feature and value of the program, alongside media affordances and effects within existing and emerging fields.

The CMAC Ph.D. will be housed in the Smith Warehouse alongside the Department of Art, Art History & Visual Studies. Students will be affiliated with the interdisciplinary arts and humanities media labs led by the CMAC program faculty. Current research lab emphases include digital archeology; emergent media arts; information science + studies; digital art history & visual culture; art, law and markets; digital humanities; media theory; and physical computing. The Franklin Humanities Institute Labs, as well as Bass Connections projects, also offer potential opportunities for students.

The Ph.D. program requirements include a proseminar focused on critical media theory and practice, courses on computational media methods, seminars relevant to media studies and subject-area specialization, humanities and interdisciplinary lab-based practicum experiences, and the production of a hybrid dissertation. Students will be expected to demonstrate coding competency as at least one of their two languages. This might involve, for example, data analysis/mining, software design, or advanced scripting for interactive media.

The collaborating units, Art, Art History & Visual Studies, Literature, ISS, and FHI, will work jointly to organize admissions and advising. Core faculty will serve as thesis advisors and lab mentors, alternate teaching the proseminar, and offer seminars relevant to the program. Affiliated faculty come from a wide range of locations around campus, including the sciences, social science and engineering, and will work with students as committee members and potential co-advisors when appropriate. Additional faculty are welcome to sign on with the program as core or affiliated faculty.

The small cohort of dedicated Ph.D. students this proposal would create will be joined by seven existing Ph.D. students in the Visual and Media Studies track of the Art History Ph.D., which was created as a bridge while this proposal was under development. The existing Information Science + Studies Graduate Certificate will be replaced by a CMAC Graduate Certificate, consolidating related efforts and resources. CMAC Ph.D. student will find an extended cohort in the MA in Digital Art History/Computational Media, the MFA in Experimental and Documentary Arts, and in Ph.D.'s in Literature, Art History and other humanities disciplines who already participate in CMAC seminars and labs.

II. RATIONALE FOR THE PROGRAM

This proposal is being submitted by the Department of Art, Art History and Visual Studies, the Program in Literature, the Information Science + Studies Program, and the Franklin Humanities Institute. All constituting parties have consulted extensively on the proposal, and provided necessary clearances, as demonstrated in the Letters of Support from the relevant Chairs and Directors.

A. INTRODUCTION

In 2013, Duke received a grant from the Mellon Foundation to develop an interdisciplinary doctoral program in Visual and Media Studies. This Computational Media, Arts & Cultures Graduate Program proposal follows upon earlier versions submitted to the Graduate School and has benefitted from extensive feedback and revision from a wide variety of stakeholders.

The proposal includes provisions for a PhD focused on the intersection of media arts and humanities, sciences, and technology, both in theory and in practice. At the core of the proposal is the computational revolution, and its implications for how we live, think, work, create, and communicate within and across various disciplines. Humanities partners include the Department of Art, Art History & Visual Studies, the Program in Literature, and the Information Science + Studies Program and the Franklin Humanities Institute (FHI).

This proposal culminates the Mellon-funded Visual Studies Initiative to promote transformative scholarship across disciplinary bounds. VSI has resulted in the development of a vibrant, interdisciplinary community of scholars in Smith Warehouse, the launch of an MFA in Experimental and Documentary Arts, an MA in Historical and Cultural Visualization, and enrichment of the undergraduate Visual and Media Studies major as well as the Information Science + Studies Certificates. The PhD builds upon existing faculty strengths in media theory, digital humanities, the histories of media and technology, new media art, and interactive technologies, and reaches out to colleagues in computer science, statistics, mathematics, neuroscience, and engineering to explore the latest concepts and innovations in computational practice and to apply them to humanistic topics. At the same time, the program anticipates art-science collaborations developing in which the infusion of artistic and design principles and the opportunity to address novel problems also advance the science involved.

The PhD also brings together partners working separately around the computational turn and its impact on the arts, humanities, and culture. The Franklin Humanities Institute is a critical core partner in offering a community of scholars in structures and initiatives whose interests overlap the program on various thematic and practical levels. The proposed curriculum will draw upon the successful model of the Humanities Labs, as well as HASTAC (the first and oldest interdisciplinary academic social network based at the FHI and the CUNY Graduate Center dedicated to changing the way we teach and learn), the FHI-sponsored Bass Connections teams, the Visual Studies Initiative partners, Digital Humanities at FHI, and the Consortium for Humanities Centers and Institutes (CHCI).

This proposal highlights Lab and humanities informational technology consortium experiences as a cornerstone of graduate education as developed through research projects, internships, and theory-practice seminar experiences. Students enrolled in the program will demonstrate in their thesis and

dissertation work both a sophisticated understanding of critical media studies and an ability to author major computational media projects, all within the context of specific research foci developed around political, scientific, aesthetic, social, or historical interests. This new multi-departmental + institute model for a graduate educational offering demonstrates the role for institutes in building new, flexible, and alternative structures for interdisciplinary graduate education, so that students can be better prepared for current societal needs and intellectual demands.

B. HISTORY AND BACKGROUND

Over the past ten years, Duke has developed a national presence in digital and experimental media studies. The Visual Studies Initiative was introduced with support from the Mellon Foundation in 2007-12 with an initial $2.4 M grant. That Initiative recognized the faculty of the Department of Art, Art History, and Visual Studies had already well established their theoretical practices as inclusive of cultural studies, a move led by Kristine Stiles and others to include visual studies more broadly, which is why we suggest housing the new PhD partly in this department. In 2009, the Department accepted its first graduate student to pursue a Visual Studies-focused PhD. A follow-on international training grant (2010-13; $500K) Under the leadership of then AAH&VS Chair Hans Van Miegroet, the Visual Studies Initiative emerged alongside other innovative media and technology projects at Duke, such as the Jenkins Collaboratory for New Technologies in Society directed by Tim Lenoir (then University Professor affiliated with Literature and AAH&VS), the Information Science + Studies Program directed by Victoria Szabo, and the emerging Wired! Lab for Digital Art History and Visual Culture, directed by Caroline Bruzelius and Sheila Dillon. The current grant, to create a PhD program, was awarded for 2013-18, and includes $ 1.3M + $ 600K donor matching funds).

Complementing the existing strengths of AAH&VS and often with the support of the Mellon Foundation, Duke made several key hires in Visual Studies, Media Theory, Media Studies, Digital Humanities, Digital Arts, and Digital Archeology. These included Bill Seaman (AAH&VS), Mark Hansen (Literature and AAH&VS), Kate Hayles (Literature and English), Nick Gessler (2011, ISS), Raquel Salvatella de Prada (AAH&VS), Mark Olson (AAH&VS) and Maurizio Forte (Classical Studies and AAH&VS). Staff with technical and academic expertise working in ISS and the Visualization Technology Group also joined the effort to develop Visual Studies, notably Patrick Herron (Information Science), and Todd Berreth (Architecture and Interaction Design), and Hannah Jacobs (Digital Humanities). Eric Monson, a physicist with database and visualization expertise, has moved on to the Libraries but continues to coordinate the Visualization and Interactive Systems interest group.

Supporting all of these developments as part of a clearly stated focus on Visual Studies in its Strategic Plan, Duke supported AAH&VS, VSI, and the above mentioned projects by retrofitting existing facilities to accommodate innovative types of collective research as Duke University in-kind contributions to the Mellon grants (Smith Warehouse, Bay 11-10, 15,000 sq.ft.) and established several operational digital laboratories at Duke; see http://today.duke.edu/2013/10/artsandscience and video http://vimeo.com/95931916. This new area was showcased as an innovative, influential Duke initiative in the IvyPlus conference (June 2014), organized by Michael J Schoenfeld, Duke Vice President for Public Affairs and Government Relations. These spaces effectively serve as an interdepartmental collaborative space with faculty-led Labs, exhibition, and teaching spaces. The Interdisciplinary Labs currently include:

- *Complex Systems* - Nick Gessler

- *Duke Art, Law, and Markets (DALMI)* - Hans Van Miegroet
- *Digital Archeology (Dig@Lab)* - Maurizio Forte
- *Emergence Lab* - Bill Seaman and John Supko
- *Information Science + Studies (ISS) Lab* - Victoria Szabo
- *Speculative Sensation Lab: S-1* - Mark Hansen and Mark Olson
- *Wired! Lab for Digital Art History & Visual Culture* – Caroline Bruzelius and Sheila Dillon

In addition to these faculty-led Labs in Smith, the recent years have seen many new graduate seminars in Visual and Media Studies taught by a larger group of AAH&VS and Literature faculty, and related offerings in the new MFA in Experimental and Documentary Arts.

Following on the successes of the first Visual Studies Initiative Mellon grant, Duke received a second Mellon grant, with Paula McClain in the Graduate School and Hans Van Miegroet (AAH&VS Chair at the time) as co-PIs. This grant supported the development of a trans-disciplinary PhD program in Visual and Media Studies, capitalizing on the innovations of the first VSI project. The primary collaborators in the 2013 Mellon grant proposal were humanities–based academic programs, the Jenkins Collaboratory, Information Science + Studies, and science-based collaborators involved in the project. Our prospective CMAC faculty has also collaborated with the Pratt School of Engineering (most notably with the Duke Immersive Environment, where several faculty members are personnel on a recent NSF grant), Duke Law School and the Nicolas School of the Environment, the Fitzpatrick Institute for Photonics, and the Duke Institute for Brain Sciences. Subsequent revisions of the proposal have led us to revise the name of the program to Computational Media, Arts & Cultures, which reflects the humanities origins of the proposal and its requirements, while at the same time leaving room for future growth.

The impact of the Visual Studies Initiative, which included ramp-in support for the new faculty members noted above, in combination with other information technology and media engagements on campus has been substantial. At the undergraduate level, the Visual and Media Studies Major in AAH&VS surpassed the enrollments of the other departmental majors, while the interdisciplinary Information Science + Studies (ISS) program courses in media production, information technology and applied computation continue to grow in popularity. VSI supported the creation of both the new MFA in Experimental and Documentary Arts and the Wired! MA in Historical and Cultural Visualization. The Visual Studies Initiative has addressed work across a broad spectrum in the humanities from critical theory, material culture studies, and photography, film and television studies to art, law and markets, art history, urbanism and architecture, psychoanalysis, cultural anthropology, philosophy, global and cultural studies, and trauma studies. It has also engaged the natural sciences, economics, mathematics, engineering, medical imaging, cartography, circuit design, information science, logic, neuroscience, gaming and the many zones of digital production in commercial and public sectors. We have developed an international reputation a series of technologically-intensive international research projects with colleagues in Europe (France, Germany, Italy and The Netherlands) that involve both research and teaching, and our faculty are sought out for MA and PhD advising by students from Jacobs University, Ca'Foscari and others as a direct result of the VSI collaborations.

Through all these efforts, over the last five years Duke has gained recognition as a major player in the study and production of digital and computational forms of knowledge. A formal PhD program in this emergent field will consolidate Duke's leadership role in this emerging field.

Although our nascent interdisciplinary program has achieved a great deal, the foundational program of our initiative, the doctoral study in Visual and Media Studies, is technically still a part of the graduate program of Art History. Though this has allowed us to admit a limited number of graduate students within the Visual and Media Studies track (9), we believe that the cross-disciplinary potential of the program is not currently optimized at the level we originally envisioned in our VSI proposal of 2007. We want to maintain the connection with the humanities, but also need to elevate the program to a truly university-wide status, while broadening its scope from Visual and Media Studies to the more inclusive Computational Media, Arts & Cultures.

The Literature Program has been an ongoing partner in this initiative. Two of the VSI faculty hired under the VSI grant, N. Kathryn Hayles and Mark Hansen, are housed there, and teach many of the media theory and digital humanities courses relevant to the program. They are major leaders in in the field, and have directed the dissertations of graduate students who have already been successful in combining subject area knowledge with digital expertise. Information Science + Studies Program is a key player as well. Nick Gessler and Patrick Herron, Research Scientists in ISS, are invaluable for their knowledge of physical computing, complex systems, information science, and data mining.

Beyond the resources within AAHVS, Literature, and ISS, Duke has innovated in digital scholarship on a variety of fronts. The Franklin Humanities Institute has promoted the Lab model of interdisciplinary scholarship through limited-term collaborations university-side. VSI and the FHI have a long history of shared interests, as reflected in the FHI Labs, which have included GreaterThanGames: Transmedia Applications, Virtual Worlds, and Digital Storytelling Lab (co-directed by Kate Hayles, Tim Lenoir, and Victoria Szabo), the Audio Visualities Lab, BorderWorks and more. The PhD Lab for Digital Knowledge the Haiti Lab (co-directed by the current FHI Director, Deborah Jenson and Laurent Dubois). The Borderworks and the Audiovisualities Labs have also been sites of overlapping interest. In addition, several projects in Bass Connections Information, Society and Culture theme and NeuroHumanities theme have shared interests and personnel with the VSI community. Computationally mediated scholarly and creative outputs have included paper and digital publications, exhibitions, games, and performances.

In partnership with the international Humanities, Arts, Sciences and Technology Alliance and Collaboratory (HASTAC), the PhD Lab in Digital Knowledge (founded by Cathy Davidson and currently co-directed by David Bell and Victoria Szabo), has provided opportunities for graduate students from a variety of disciplines to come together around the challenges and opportunities digital forms of knowledge production offer, with special attention to digital pedagogy and social media. The PhD Lab students co-authored a volume in the prestigious University of Michigan Digital Humanities series. The Humanities Writ Large initiative, also funded by the Mellon Foundation, has offered seed grants and support to various faculty around campus interested in digital scholarship. In 2015 the FHI also committed to support a three-year Digital Humanities Initiative to continue and extend this work, and to bring together the disparate strands of digital humanities and computational media occurring around campus.

The Libraries have also demonstrated their commitment to computationally mediated scholarly practices through the hiring of two Data Visualization Specialists, and a new Digital Scholarship Services Director. Faculty and students involved in Visual and Media Studies and related activities in Smith Warehouse already work closely with these staff on courses, projects, workshops, and events. Trinity College hired a Digital Humanities Specialist whose expertise complements that of the Library personnel. The Rubenstein Library has hired a digital history specialist to lead the Archives Alive initiative, which brings special collections material into wider circulation in part through digitization

efforts. In Bass Connections, the Information, Society and Culture Theme is sponsoring a number of special projects that tie together information technology and culture, as well as helping support teaching in the ISS Program. OIT has committed to Research Computing in the Humanities with the hire of a specialist with training in that area as well.

Smith Bays 10-11 is already a hub for interdisciplinary collaboration in media theory and practice, having offered a nascent community for this growing under the banner of "Media Arts and Sciences." The Media Arts and Sciences community hosts the Visualization and Interactive Systems group, a cross-campus collection of accomplished staff scientists and media practitioners interested in media, data, and creative computation. This group currently meets weekly to share research, plan workshops and activities, and coordinate infrastructure issues. Individual members of this group include staff from the Data and Visualization team in the Libraries, the Duke Immersive Virtual Environment in Pratt, and representatives from the Smith Labs, including the Wired! Lab, Information Science + Studies, the Emergence Lab, the Complex Systems Lab, and the Digital Archeology Lab. VIS Group members already teach workshops to current graduate students, consult on research projects related to databases, visualization, digital installations, algorithmic processing, and media production. Similarly, the Digital Humanities Consultant in TTS, staff from Digital Scholarship Services and VSI-related labs meet periodically for a DH Klatch to share ideas and coordinate activities. The group takes advantage of these networks of collaboration to support research lab projects, digital modules in existing courses, and ongoing training opportunities across campus. For the last few years the Computational Media Studio course for the MFA in Experimental and Documentary Arts, and the MA in Historical and Cultural Visualization Proseminars, and numerous other undergraduate and graduate courses in AAHVS, Literature, and Information Science and Studies have benefited from these these connections resources.

The intersection of scholarly research, archives, and digitally-facilitated approaches to creative expression have also been demonstrated at Duke through major arts innovations in Dance, Music, and Performance Studies. Thomas DeFrantz of Dance and African and African American Studies has led research into dance and technology though his SLIPPAGE: Performance|Culture|Technology company performances and classes, and Bass his Connections project on "Live Processing and Live Art. "Scott Lindroth of Music and Aaron Greenwald of Duke Performances have put together the "From the Archives" series of archive-driven, multimodal performance projects presented by Duke Performances, including William Tyler • 'Corduroy Roads' (photographic materials from Alexander Gardner / George N. Barnard), Jenny Scheinman • 'Kannapolis: A Moving Portrait' (films from H. Lee Waters), and Hiss Golden Messenger • 'Heart Like a Levee' (photographic materials from William Gedney).

Taken together, these formal and informal collaborations demonstrate Duke already has the needed expertise, enthusiasm and support for a formalized graduate program in Computational Media, Arts & Cultures. What is lacking now is an organizational structure that brings them together into an integrated community. The Digital Humanities Initiative at FHI will help provide this laterally, and the PhD in Computational Media, Arts & Cultures will provide a focus for faculty and student researchers in the field. In addition, the Graduate Certificate in Information Science + Studies will be renamed and refocused as a Graduate Certificate option for students from other departments and programs interested in Computational Media, Arts & Cultures topics as a secondary field of study.

Already graduate students involved with these various digital initiatives on campus have gone on to successful careers post-Duke. We propose to build upon this start by offering a clear pathway for students whose work fits squarely into a PhD trajectory, as well as offering opportunities for

students whose primary interests are in related fields, but who wish to delve into computational media topics as part of their work. Just a few of the recent humanities graduate students who have gone on to successful careers thanks in part to their experiences in Duke's various computationally-inflected centers, labs, and programs include:

Mitch Fraas, History Ph.D., Haiti Lab. Currently Curator of Special Collections, Kislak Center University of Pennsylvania,. Mitch worked on the Rebuilding Women's Rights and Haiti Digital library projects.

Patrick Lemieux, AAH&VS VMS Track. Currently Assistant Professor at UC Davis, Department of Cinema and Digital Media. Patrick co-created an alternate reality game with the GreaterThanGames Lab; he also created game mods and deconstructed computer game consoles as part of a TA-ship for the Computational Media course.

Patrick Jagoda, English and ISS Certificate. Currently Associate Professor at University of Chicago, English and New Media Studies, and Director of the Game Changers Chicago Design Lab. Patrick studied computer games and created multimodal essays as part of his ISS certificate project; co-created and published on an and alternate reality game with the GreaterThanGames Lab while an affiliated scholar in his early years at Chicago. He recently received tenure.

Whitney Trettien, English and Audivisualities and PhD Lab Scholar. Currently Assistant Professor of English and Comparative Literature, UNC- Chapel Hill. Whitney co-created the Soundbox sound studies project as part of the AudioVisualities Lab and the PhD Lab at FHI. She also created a project called Cut/Copy/Paste: Echoes of Little Gidding that focused on historical analog/digital media remix.

Allen Riddell, Literature and ISS Graduate Certificate. Currently a Postdoc at Neukom Institute for Computational Science and the Leslie Center for the Humanities at Darmouth. Allen studied Statistics and received an MS degree alongside his PhD; created statistical topic models of a large collection of historic novels as his ISS certificate project

Malina Chavez, MFAEDA, Coordinator of UNC Digital Innovation Lab. Malina created a multimodal installation project as part of the Computational Media course in the MFA.

Melody Jue, Literature, S-1 Speculative Sensation Lab. Currently An Assistant Professor of English at UC Santa Barbara. She created a map-based project focused on the "whale" perspective of Earth's geography as part of a theory/practice environmental humanities project.

Zach Blas, Literature and ISS . Was an Assistant Professor at the University of Buffalo, now at Goldsmith's, London. He created a multimodal installation artwork around the queer body and identity as part of his ISS graduate certificate project.

Sandra Van Gienhoven, Art History, DALMI Lab and RENCI Visualization Grant. Currently a Visiting Assistant Professor at ,Erasmus University, Rotterdam. She co-created created a database of art market information and visualized it as part of a visualization grant from the RENCI institute in collaboration with the Duke Art, Law and Markets project.

This proposal offers a formal pathway for graduate students, like those noted above, who want to pursue Computational Media, Arts & Cultures as a primary focus at the PhD Level. It draws upon the resources provided by the Mellon Foundation, and combines them with various strands of activity

already happening on campus. It can take advantage of already-existing physical and administrative infrastructure in Smith Bays 10-11, AAH&VS, ISS, and the FHI, as well as in the Libraries, Trinity, Pratt, and OIT. It formally brings together faculty who are already working in computational media, technology, digital arts, and information science with interested students with a variety of disciplinary backgrounds.

The program we are proposing capitalizes on two of Duke's areas of strength: its enviable tradition of innovative and successful interdisciplinary work in the digital humanities and the vibrant set of research and practice-centered engagements noted above. The program will appeal to a wide range of students, from already-accomplished artists seeking to articulate or expand their research programs to the new brand of hybrid student unable to repress the conviction that the media activities central to their lives have deep and consequential theoretical stakes. We also aspire to create a new type of hybrid practitioner and scholar, one who is conversant with old and new paradigms of the humanities as well as with those of the information sciences and new media.

Future graduates of the program will have an extra edge and enough leverage to pursue a new type of career in higher education, multi-media companies, and the community, all of which will increasingly be dominated by rapidly evolving computational media, new media arts and human interface visualizations that need to be fully understood and critically evaluated. Mastery of these media is not only critical, but will also provide theoretical sophistication and a realization that creativity is a powerful, but often neglected problem-solving force in graduate programs. We therefore deem solid artistic training in the computational arts integral to this degree as well.

The world has taken a digital turn. The moment is ripe for Duke to take a leadership role in the shaping of this stage of interdisciplinary knowledge-production. Duke's commitment to interdisciplinarity—clearly articulated in the early 1990s by Philip Griffith—provided the foundation for the learning experiments undertaken by FHI, ISS, Wired! and Duke's other innovative interdisciplinary programs. Duke already has the proper staff and distinguished scholars essential to the program's success. They are already mentoring graduate students working on projects with a strong media or computation component. As noted above, AAH&VS and other humanities graduate students who have self-identified with Computational Media, Arts & Cultures goals through the ISS Graduate Certificate, earning VSI grants, and engaging with Lab-based projects have received prestigious tenure-track jobs and post-docs. Other students engaged in our classes and labs have exhibited their work at international digital art shows, published in leading journals, and presented their work at prestigious conferences. We want to clear the path for select students to do even more, alongside the wider community of interested scholars.

C. AN INTERDISCIPLINARY, INTERDEPARTMENTAL PROGRAM

This new proposal is intended to realize the creation of an interdisciplinary, interdepartmental PhD in Computational Media, Arts & Cultures. After extensive consultation and reflection on the best way to construct a program, we have identified the Department of Art, Art History & Visual Studies, The Program in Literature, the Information Science + Studies Certificate Program, and the Franklin Humanities Institute as core programmatic partners. We embrace the possibility of expanding to include as core collaborators other departments and programs, as well as individual faculty with related interests and expertise.

Because their initial numbers will be small, the program's PhD students will find their cohorts in Art, Art History & Visual Studies, Literature, Music, Computer Science and other related disciplines where

computational media forms are being studied and explored, in theory and in practice. We anticipate strengthening these interdisciplinary connections by offering a reframed Information Science + Studies Graduate Certificate that will align closely with core requirements in the PhD Program and offer an extended community. These students will also mix and mingle with graduate students from Duke, UNC, and NC State in the PhD Lab for Digital Knowledge at the Franklin Humanities Institute.

The CMAC Leadership will ensure that students in the new program are integrated into the wider Duke graduate community in the following ways:

1. CMAC PhD students will be joined by the MA students in the Digital Art History/Computational Media for the Proseminar course, and in other courses taught by CMAC core faculty.
2. CMAC PhD students will be joined by CMAC Graduate Certificate (formerly Information Science + Studies) students at events and activities in the Smith Warehouse. They will receive first-round invitations to any workshops and events organized with that group, and will have access to the ISS Lab for their own digital research projects requiring special hardware and software.
3. CMAC PhD students will automatically be made members of the Franklin Humanities Institute's PhD Lab in Digital Knowledge Fellows Program. This competitively-selected group of students will be meeting on bi-weekly basis with faculty mentors, and takes turns workshopping projects and sharing ideas. PhD Lab Fellows also share workspace in the PhD Lab, and have the opportunity to organize speakers, attend conferences, and engage in professional development activities targeted at scholars working in interdisciplinary programs and on non-standard digital projects as part of their PhD work..
4. As the Triangle Digital Humanities Network develops, CMAC students will be invited to mixers and and cross-campus events organized for the wider community. CMAC students will be encouraged to help organize the biannual, multi-day Collaborations: Humanities, Arts & Technology Festival in collaboration with UNC and NC State students (the festival rotates among the three campuses), and to share their own work at that venue and in other local exhibitions.
5. CMAC D students will be strongly encouraged to participate in Bass Connections and FHI projects organized by CMAC faculty, and will actively be introduced to potential mentors for other project work.

In structuring this program as a collaborative effort, this proposal draws inspiration from Duke's long commitment to interdisciplinarity, as well as from other successful interdepartmental PhD programs. We anticipate that the startup administrative and teaching burdens will be modest, given the already-existing infrastructure, curriculum, experience, and expertise on campus. As the program grows, we anticipate it becoming a major attractor new students and faculty interested in the computational turn in interdisciplinary scholarship and creative practice.

Our proposed program brings together the rigor of a research-based graduate studies with a practical and technological focus on advanced training in a media practice or media- (and data) intensive scientific research in the humanities. The philosophy of the program is shaped by a conviction that the conditions for knowledge production in today's global world have been fundamentally altered by the computational revolution. From experimental practices in the sciences to research methodologies in the humanities, knowledge has come increasingly to depend on the gathering and analysis of large aggregates of data that in some crucial ways cannot be "understood"

or "manipulated" without the assistance of sophisticated computational methodologies, new forms of visualization and media technologies. The humanities have traditionally been defined by print culture of an analytical kind—journal articles, monographs, and reviews. Contemporary digital media and non-textual forms of socially engaged scholarly production now offer an ever-expanding field of innovative methods of study and modes of inquiry. These include new research methods, modes of communication, and multiple presentation strategies.

The proposed PhD in Computational Media, Arts & Cultures consolidate the innovative work of the last decade of many Duke scholars, offers both faculty and students the potential to explore these modes and methods and redefine the relation between humanities and the sciences. This new graduate program also reexamines the division between theory and practice that defines so much of university life. The program, its faculty, and students directly engage with the rich contributions from the 'arts,' broadly understood to include the praxis of humanistic knowledge, as well as the various applied sciences. Through its faculty and students Duke has already emerged as a leader in the fields of digital humanities, media studies and public scholarship. It is time for this positive reputation in the theory and practice of Computational Media, Arts & Cultures to be fully instantiated in a formal PhD program.

The focus of the PhD in Computational Media, Arts & Cultures at Duke will be to integrate multi-modal inquiry, including computational design, data analysis and new media art, with scholarly investigation at the interface of the humanities, the social sciences and the sciences. As scholars in the digital humanities, we have understood that computational media has profoundly transformed the research paradigms and epistemology of the humanities and the many disciplines it affects. We have noted that students are no longer passive consumers of academic knowledge but also active producers of new digital content, with the potential to apply new thinking and creative energy to more established modes of research. To address this in the context of a research university it is our mission to attract a new generation of hybrid scholars and students for whom interdisciplinary connections between the humanities, social sciences and the sciences have become essential.

A key component of the program is the "horizontal" dimension of the envisioned integration of theory and practice. Students will be expected not simply to combine some theoretical endeavor with some practical component, but to do so in such a way that the two become integrated, allowing them to integrate seemingly unrelated fields of inquiry. Thus, far from forming a mere illustration or instantiation of a governing theoretical program, media practice will here perform significant theoretical work of its own, leading to a scholarly research program that is fully responsive to the unique affordances of our digital culture and to the generational proclivities of tomorrow's cultural innovators and leaders. Our students will be encouraged to present scholarly and creative work in venues like the Society for Literature, Science and the Arts, ACM SIGGRAPH, the International Society for Electronic Arts (ISEA), the Humanities, Art, Science, and Technology Alliance and Collaboratory (HASTAC), and Ars Electronica as well as in the innovative branches of more traditional academic humanities and social science venues such as the Modern Language Association, the College Art Association, the American Historical Association, the Society for Classical Studies, and the National Communication Association. Research "publications" by our students will similarly include digital venues, real and virtual exhibitions, and more conventional print media formats.

D. THE INTERDISCIPLINARY HUMANITIES LAB MODEL

Central to the premise of the proposed Computational Media, Arts & Cultures graduate program is the Interdisciplinary Humanities "Lab" model. While not exactly the same as a science lab, humanities labs are characterized by unusual degrees of a collaborative, project-based orientation that yields tangible results. Students in the program will be expected to engage with Labs as part of their required Practicum Experiences in the program. As we have discovered from our various experiments in interdisciplinary project development at Duke, sustained engagement in collaborative projects encourages deeper understanding of the norms and affordances of different disciplinary practices. The Art-Science community is particularly aware of this, and increasing numbers of grant funders ask for teams to reach across conventional academic boundaries. (See http://arts.gov/art-works/2015/5-times-art-science-collaborations-made-perfect-sense from the NEA. *Leonardo*, the influential journal of the International Society for the Arts, Sciences and Technology, for example, emphasizes "the writings of artists who use science and developing technologies in their work." http://www.leonardo.info/leoinfo.html). Individual Labs, including Duke Art, Law and Markets, the Wired! Lab for Digital Art History and Visual Culture, and the DiG Digital Archeology Lab are already collaborating on research projects and exhibitions internationally; our new graduate students could participate and extend those efforts, in turn developing their own 21st century scholarly profiles, like those of the pioneering graduate students noted earlier.

What these students gain from these experiences is not only a way to push their own limits, but also to understand the fundamental value of collaboration to new forms of knowledge production mediated by computational practices. Technologies of communication, analysis, and design can scaffold understanding by instantiating core principles into software and interactive environments; methods of interpretation can travel across disciplines as metaphors or agents. A database infrastructure includes curated categories of metadata and standardized formats that shape the construction of historical archives or interactive media; a text analysis system includes scholar designed document type definitions, stoplists, and queries that shape its results; GIS software tools embed assumptions about the values of scaling, proximity and space to analysis and interpretation; 3D modeling and environments may privilege interaction speed over verisimilitude, or completeness over ambiguity; time-based media may privilege runtime and experienced time over elapsed time. Facility with these resources – and with the ability to critique them in theoretical and cultural terms – are at the heart of our program.

One of the key goals of the program is that we want to teach our grad students to think algorithmically (as well as visually, temporally, critically, historically etc.). To this end it is important that all Ph.D. students acquire proficiency in certain computer languages. Requirements of language and tool proficiencies are common practice among Ph.D. programs. Candidates for the Ph.D. in humanities departments, for example, are typically required to demonstrate proficiency in two natural languages relevant to their research field, such as French and German, or Chinese and Korean, etc. Similarly candidates for the Ph.D. in Philosophy are typically required to demonstrate proficiency in the fields of propositional logic and modal logic; while students in Economics are required to be proficient in areas such as differential equations and statistics.

We will require students to have training—equivalent to one semester—in a procedural language, such as C, Java, or Python or equivalent experience. This training will fulfill the role of a standard language requirement, and can be met either through testing or coursework. They may demonstrate this background prior to admission through coursework, participation in summer workshops, or demonstration of skills developed though self-study. Students will also be encouraged to take up to two undergraduate courses (or graduate courses) in Computer Science, Statistics, or other relevant

fields to develop their capabilities as needed. They will take a "language exam" with a faculty member to demonstrate their proficiency.

We have tested this model in Art, Art History and Visual Studies already; four students in the Visual and Media Studies track of the Ph.D. (the proto Computational Media, Arts & Cultures track) have successfully completed this test.

- One is using Python and SQL so she could analyze a mass of legal arguments related to art copyright
- One is using Processing so she can create computationally-controlled installation bioart
- One used Assembly and C# to develop videogame modifications for theory-driven art
- One is using Python and JavaScript for installation automation and web presentation of media research

In addition to a standard processing language, Ph.D. candidates in Computational Media, Arts & Cultures will be required to demonstrate proficiency in either a second core group of languages related to the basics of programming time-based or interactive media, or in a human language relevant to their studies.

E. CHARACTERISTICS OF THE CONSTITUTING PARTNERS

The department of Art, Art History, and Visual Studies (AAH&VS), the Literature Program, the Franklin Humanities Institute (FHI) and the Information Science + Studies Program (ISS) are collaborating to co-sponsor these new graduate programs.

Our core collaborators include a strong balance of established theorists, historians, and practitioners. Art, Art History, and Visual Studies has pursued an interdisciplinary vision of graduate formation since the establishment of its PhD Program in Art History in 1991. The department was renamed in 2006 to better reflect the research and teaching interests of the faculty, and the Visual Studies undergraduate major, the design of which was led by Kristine Stiles, was instantiated in 2009. The Department has also shown its ability to successfully partner with other units in the creation of another terminal degree, the MFA in Experimental and Documentary Arts (co-directed and operated since 2012 with the Center for Documentary Studies and the Arts of the Moving Image Program at Duke)..

Duke's Program in Literature takes a philosophical and theoretical approach to many different cultural phenomena that students and faculty work on, alongside film, video, and the new media, and alongside cultural studies broadly conceived. Faculty in the program are in the forefront of thinking critically about media and culture, and are leaders in the fields of media theory, digital humanities, and science and technology studies. Many are already doing the work of the PhD program as mentors to individual students inside and outside of Literature itself through the many interconnections noted above.

Information Science + Studies, as a research center and certificate program, provides graduate students critical training in research technology and new media production methods. As a hub for graduate students interested in physical computing, digital mapping, web development, app design, and other technological innovations, it connects theory and practice courses through its programs

and activities. The administrative staff member currently assigned to supporting ISS could take on the role of DGSA for the proposed program, with the Business Management role undertaken by the Business Manager who currently serves AAH&VS and the MFAEDA Program.

The Franklin Humanities Institute brings to the project funding for the Digital Humanities Initiative, staffed coordination of interdepartmental efforts, student access to its various labs and learning opportunities, and funding for visiting scholars. It offers the potential to appoint graduate faculty (pending approval), who could in turn serve on the MA and PhD Committees of the graduate students in the program.

The Computational Media, Arts & Cultures program will also work to integrate visual, digital and computational initiatives across the campus, like that of the "Big Data" Information Initiative (iiD) and the " Bass Connections, all of which are interconnected with both ISS ad FHI. It will take advantage of existing relationships with the Libraries, Data and Visualization, Digital Humanities, and Information Technology resources on campus and build upon them for training and consulting purposes. The proposed PhD program offers Duke the opportunity to take a leadership role in modeling the future of the humanities and the interpretive social sciences as part of this effort.

F. RATIONALE FOR A DISTINCT PROGRAM

The PhD program in Computational Media, Arts & Cultures is distinguished from other degrees offered at Duke by its focus on interactive, digital, and computational scholarship across media platforms that significantly include, but are not restricted to text-based intellectual production. At present, students with a non-text based component in their research tend to work at the margins of their programs. They face the challenge of satisfying conventional departmental requirements while also engaged in intellectual production without proper recognition or support. This is also true of students interested in bringing quantitative and computational approaches to "humanistic" research. Their extra-departmental advisors may hail from various parts of campus, and their areas of specialization may include subjects not covered by their home programs. The new PhD program will bring together these students with primary interests in theory and practice, while also catalyzing the broad student interest that already exists at Duke in public scholarship, and digital and computational media within the humanities and interpretative social sciences.

The program as currently conceived brings together existing subject-area graduate courses taught by the core faculty in AAH&VS, Literature, Music, Classical Studies, Mathematics, ISS, and others. Students in the program will study digital media forms, information science techniques, and socially engaged practices, deploying them to transform academic research within their specific areas of interest. They will draw upon Duke's extraordinary faculty and staff for expertise in media theory, cultural criticism, media studies, media history, digital humanities, computational analysis, and socially engaged intellectual production. While our students will participate actively in seminars and activities in other departments and programs, no other existing degree program at Duke can offer them the distinctive theory/practice focus and requirements that are proposed in the program. By offering lab experience practicums alongside theoretical and historical engagements with the digital, the PhD in Computational Media, Arts & Cultures will encourage interaction among these units, while remaining distinct from them.

G. UNIT SPONSOR CONTRIBUTIONS

As the originating Departmental sponsors, and as core members of the Visual Studies Initiative, the Department of Art, Art History & Visual Studies and Literature will play crucial roles in the Computational Media, Arts & Cultures PhD. In addition to significant faculty involvement and staffing, AAH&VS and Literature will encourage curricular connections through cross-listing and partnerships in the Smith Warehouse Labs. Information Science + Studies, reframed as the Center for Computational Media, Arts & Cultures, will continue to be a hub for graduate student practice-based work in the field, while the PhD Lab in Digital Knowledge in FHI will create connections with the wider community.

Our key operational principles reflect these commitments:

- *Proximity Matters*: we envision a sustainable graduate program, with operational financial stability and with a dedicated core of faculty, students, and resources in close proximity to each other in the retrofitted Bay 11-10 in Smith Warehouse (15,000 sq.ft.)*;*
- *University-wide Impact*: we envision graduate studies in Computational Media, Arts & Cultures at the interface of the humanities, sciences and the social sciences, with an organizational structure that reflects its mission and in close collaboration with university institutes, schools and academic units;
- *Connection of Theory to the Practice*: we aspire to develop a trans-disciplinary teaching and research curriculum with a clearly articulated trajectory and assessable deliverables, including the student's active participation and integration of the eight on-site labs in Smith Bays 10-11 and in the rotating FHI labs.

AAH&VS and Literature will also benefit from increased faculty and student access to already-existing workshops and lab modules on database design, visualization, 3D modeling, physical computing, 3D printing, web exhibitions, interaction design, mobile applications, virtual reality and digital arts production taking place at both ends of Smith Warehouse and beyond. As the home of the existing MA in Historical and Cultural Visualization in the Wired! Lab, AAH&VS also offers opportunities for teaching, research, and training collaborations around specific histories, technologies and techniques relevant to the field. Additional experimental and traditional studio arts facilities and work spaces will also be offered by AAH&VS when of use to the program's students and projects.

As noted above, the PhD program will draw upon the existing Information Science + Studies Graduate Certificate infrastructure to coordinate and develop the digital media practice and computational components of the program. This includes the expertise gleaned in teaching the Computational Media and Historical and Cultural Visualization courses for the MFA in Experimental and Documentary Arts, which ISS helps support through 3D printing, hardware, and software resources, and the MA in Historical and Cultural Visualization, and share in those offerings and resources. Specialized workshop and course components will also be developed in active partnership with affiliated faculty in Mathematics, Statistics, and the Pratt School of Engineering as we expand and deepen our partnerships with those units. In addition, both the AAH&VS and ISS undergraduate programs will provide TA and RA opportunities to graduate students working on C-MAC Bass, MFA, and other media and computation-related projects. These opportunities might also fulfill core TA and RA graduate student responsibilities in the PhD Program, as well to students pursuing the C-MAC Certificate or involved in the Labs. We also anticipate potential collaboration with the proposed SSRI Data Science MA in terms of offering humanities-oriented courses that may be of interested to their students, as well as sending interested students into some of their courses on a case-by-case basis.

We anticipate the Franklin Humanities Institute, under the leadership of Deborah Jenson, will play a key role in envisioning and sustaining the interdisciplinary program. Jenson has previously collaborated with Szabo on peer-reviewed digital publications and on media arts-related teaching. Jenson's work in NeuroHumanities crosses disciplinary and school boundaries. FHI will provide an institutional relationship for faculty outside AAH&VS and Literature who are participating in the Computational Media, Arts & Cultures PhD program, and programmatic support to graduate students involved in both the PhD and the Graduate Certificate programs. The collaboration with the Franklin Humanities Institute ensures the interdisciplinarity of the PhD, providing potential research connections not only to individual departments and programs but also relevant Institutes and Initiatives from around campus. In addition, the FHI is the portal for numerous grants from the Mellon Foundation, a key funding source for the Computational Media, Arts & Cultures PhD program and its future development. Bringing in the FHI as a full partner in this interdisciplinary program has the added benefit of strengthening the University connections with Mellon and builds effectively on existing partnerships and networks.

In addition to its coordinating role, the FHI will contribute to Computational Media, Arts & Cultures through the new Digital Humanities Initiative (DHI), which was launched in Fall 2015. DHI, headed by Victoria Szabo, will help coordinate, rationalize, and leverage disparate research partnerships and digital media and computation training opportunities already available through ISS, the Smith Labs, the cross-campus Visualization and Interactive Systems group, the Libraries Data and Visualization and Digital Scholarship Services groups, and OIT. We anticipate FHI and DHI will serve as a hub and crossroads for digital humanities and computational media studies across campus. David Bell, who served in deanships in the graduate school, will continue to play an active role in the new Digital Humanities Initiative through ongoing involvement in the PhD and the PhD Lab in Digital Knowledge. Combined with the labs already working within the Smith Warehouse, the Digital Humanities Initiative will significantly extend and strengthen the lab component of courses within the Media Arts and Sciences curriculum.

One of the key contributions of the unit sponsors will be to develop a wider cohort and community for the students involved in the CMAC program.

III. CONSEQUENCES FOR OTHER UNITS

A. PRECEDENTS

We anticipate the impact on other programs to be positive in the sense that we will provide resources and support to existing graduate students who are underserved, as well as raise Duke's profiles as a leader in Computational Media, Arts & Cultures and related fields. Over time the MFA in Experimental and Documentary Arts has shown itself to attract students interested in explicitly documentary practices, often in photography and film. While there is some potential overlap amongst student interests, this is emphasis is distinct from our explicit focus on computational practice and the theoretical and critical cultures of media, art and computation. Similarly, the MA in Historical and Cultural Visualization has evolved to be focused most explicitly on museum exhibition practices for art history, architecture, and visual culture. This program would serve the needs of a broader range of graduate students interested in Digital Humanities and Computational Media as scholarly and critical forms found in academia, publishing, and industry.

We recognize that though our programmatic objective may vary, we potentially share an number of digital "tools" and critical/theoretical foundations for our work. We have discussed with our colleagues the possibility of sharing our practice-based courses with both the MFAEDA program and the MA in Historical and Cultural Visualization. Our view is that having our graduate students mix and mingle through the practice-based courses offered by our various programs is beneficial in its own right. Computational Media, Arts & Cultures faculty are committed to offering the Proseminar course every year, and welcome the opportunity to share or even merge this Proseminar course with that in HCVIS if all parties are in agreement.

B. SPONSORING UNITS

Art, Art History & Visual Studies and Literature PhD Programs

The programs most affected by this proposed PhD are Art, Art History & Visual Studies and Literature. As noted above, both Departments see this program's focus as outside the core of their current graduate program structures, and yet also as an important site of future collaboration and growth. Rather than creating negative consequences, the effects will be positive, since faculty members will be able to address students interested in exploring computational media, in theory in practice, will have a framework and support structure through which to pursue their studies.

The core faculty named in the initiative already teaching the graduate seminars we are proposing to include in the program, and the interdisciplinary media labs the program will rely on already exist in Smith Warehouse. The number of graduate students involved in this new program is also expected to be quite modest (0-2 students matriculating per year, subject to funding).

MA in Historical and Cultural Visualization

For the existing MA in Historical and Cultural Visualization sponsored by Art, Art History & Visual Studies this program adds a few new students to the existing Proseminar and practice-based courses. The community of students studying digital humanities, humanities data, visualization and related topics already includes graduate students from around campus. These seminar style courses could easily accommodate a few more students.

We see close ties to both tracks of the MA in Historical and Cultural Visualization. The **Digital Art History** track is sponsored by the Wired! Lab for Digital Art History & Visual Culture, and brings in a cohort of students who are engaged with the digital transformation of research and practice in the fields of art and architectural history, and will provide part of the cohort of students broadly interested in this subject matter. Some students in this program may choose to pursue the CMAC Graduate Certificate as part of their MA studies.

The **Computational Media** track in the AAHVS MA has direct connections to our PhD in its aspirations and focus, as it engages the various Media Labs established under the Visual Studies Initiative. Workshops and programs created to support that track, and related programs, will be of immediate benefit to our PhD students. We also plan for future revenues the Computational Media track of the AAHVS MA to support the CMAC PhD program in the future, and have prepared our budget accordingly, will the full understanding and support of AAHVS and Arts and Sciences that this is our objective. (See the Business plan, below.)

Information Science + Studies (ISS)

Information Science + Studies would see immediate benefit from the realization of this project. In fact, the CMAC PhD could be considered the culmination of its programmatic objectives. Established in 2001, the ISS Program's "mission is to study and create new information technologies and to analyze their impact on art, culture, science, commerce, policy, society, and the environment." ISS pre-dates the Visual Studies Initiative, and has been a core collaborator in its development. ISS personnel and resources have been involved in establishing and maintaining the Visual and Media Studies undergraduate major, the MFA in Experimental and Documentary Arts, the MA in Historical and Cultural Visualization, and now this proposed interdisciplinary, interdepartmental PhD. The ISS lab is already a home for undergraduate and graduate students interested in media and computation practice.

ISS also pre-dates the Bass Connections Information, Society, and Culture theme, and has been a key player in establishing its curricular presence on campus. ISS offers TA and RA opportunities to graduate students interested in digital humanities and computational media topics, now in part though its relationship with Bass. ISS houses the Information, Society, and Culture Undergraduate Gateway course (taught by Herron, an affiliated Instructor), and has expanded its key ISS 240: Web-Based Multimedia Communications course with the support of Bass Connections funds, which has provided graduate students opportunities to teach sections of this popular and successful course.

This is relevant to CMAC because **Bass Teaching Fellows** currently teach four sections of the course each year. While these and other sections are sometimes taught by graduate students assigned from the MFA and AAHVS PhD programs, these students do not always have the requisite background or experience to participate effectively. ISS would welcome a cohort of interested and capable CMAC graduate students to teach these sections, and also to TA other relevant practice-based courses, such as Complex Systems and Physical Computing (Gessler). Advanced CMAC students could also teach their own topical courses through ISS, providing benefit to themselves and to the undergraduate community who clamor for more media/computation hybrid courses. These teaching opportunities would give CMAC graduate students teaching experience relevant to the academic job market in computational media, digital humanities, media studies and related fields.

As the home of the Bass Information, Society, and Culture Undergraduate Certificate 2.0, ISS can also facilitate project mentoring and interdisciplinary research team collaboration opportunities to CMAC

PhD students. This connection benefits all involved. The ISS Program Director, Victoria Szabo, is also the Co-Director of the Bass ISC theme. For CMAC PhD students who are interested in pursuing Lab Practicum experiences outside through Bass, ISS will provide an important bridge.

As we have noted, part of this proposal involves renaming the ISS Graduate Certificate to be the Graduate Certificate in Computational Media, Arts & Cultures. Many of the ISS Affiliated faculty members are part of this proposal, and in fact this proposal grew in part out of their ongoing associations through ISS and other activities, such as FHI partnerships. Integration of the ISS Graduate Certificate into this program structure simplifies oversight and management of overlapping programs, while also helping solidify an identity for CMAC on campus. From the perspective of ISS as a research center, lab, and curricular program, this partnership does for the Graduate Certificate what the partnership with Bass did on the undergraduate level: provide a mechanism for ongoing support of its mission at all levels of university life.

Franklin Humanities Institute

The addition of the Franklin Humanities Institute to our sponsoring team helps offset any additional pressure on the sponsoring programs by providing a space for graduate students interested in digital media and computation to come together for workshops and mutual support. The Digital Humanities Initiative at FHI houses the PhD Lab for Digital Knowledge, which right now is outside any formal curricular structure. FHI will benefit from the opportunity to enroll PhD Lab students in the CMAC Certificate, and to support CMAC PhD students in developing their talents.

FHI, like ISS and Bass, has already been a key partner in developing pathways into digital scholarship at Duke through the FHI Interdisciplinary Labs and other activities. The Digital Humanities Initiative was created in part to help coordinate and give voice to the disparate Duke community members engaged with the digital turn in our society. DH+, the DHI motto, embraces both the critical transformation of existing scholarly practice through computation, and the study of computation and its impact on human culture itself. By supporting the Duke STEAM Challenge, in partnership with the Vice Provost for Academic Affairs and ISS, DHI is creating opportunities for students to gain mentoring and recognition for interdisciplinary digital practice. We are able to leverage these and other existing efforts on campus to develop best practices for digital humanities, media, and critical computation in part because the core faculty are already the ones driving these efforts.

This program will offer project mentoring and skills development to its graduate students through FHI and Bass relationships, while at the same time catalyzing DHI efforts to create training opportunities for grads interested in digital media and computation for the arts and humanities from around campus.

C. RELATED PROGRAMS AND UNITS

MFA in Experimental and Documentary Arts

While in some ways the programs as a whole overlap in their interests, MFAEDA is ultimately focused on artistic and documentary production, while this PhD is focused equally on media theory and other forms of computationally-mediated practice. Our PhD has the support of Tom Rankin, Director of the MFA (endorsement letter attached). The MFA in Experimental and Documentary Arts offers a graduate seminar in Computational Media production that we have already opened up to include interested MA and PhD students. Some MFA students currently teach as TAs in Information

Science + Studies, but they typically do not have the requisite computing knowledge to serve as Lab RAs, so we do not anticipate any lost support opportunities for those graduate students. In fact we have already had some students in the MFA program express interest in completing the CMAC PhD, should it come online.

Data Science MS (Proposed), SSRI, and iiD

As we have developed this PhD proposal, we have worked closely with iiD and consulted with the leaders of the proposed MS in Data Science sponsored by iiD and SSRI. We anticipate mutual benefit from shared summer "bootcamp" workshops designed to help interested graduate students "skill up" in information design and data management topics, and expect that some of our existing and new graduate seminars will be of interest to Data Science MS students as electives. We are already establishing relationships through the Duke Art, Law, and Markets (DALMI) Lab and courses with this team of researchers, and our proposed Faculty and Staff includes Social Sciences and Sciences partners (Calderbank, Dauberchies, Rundel, Herron) who are deeply engaged in data science and computation as they relate to cultural topics.

Bass Connections

As noted above, Bass Connections Information Society and Culture theme is already closely tied to ISS curricularly and structurally. In addition, Bass partners with FHI to support and develop interdisciplinary project teams with a strong humanistic component. We anticipate the program to have a positive impact on Bass in that it will offer students a key way to realize the theory-practice ambitions of the program. We anticipate graduate students participating in Bass Teams as part of their Practicum Experience requirements.

Duke Libraries

Data and Visualization Services and Digital Scholarship Services are already co-developing courses and workshops with the faculty involved in this proposal. This program catalyzes work done at both "ends" of Smith Warehouse (the Franklin Humanities Institute and the Visual Studies Initiative Media Labs) in media and computation, enabling us to develop together best practices for media and computation in the arts and humanities in ways that are scalable, sustainable, and of high quality. The ongoing Visualization and Interactive Systems group and DH Klatch are interest groups made up by primarily staff from AAHVS, the Libraries, and OIT who are closely involved in the Smith and FHI Lab initiatives already. Together they are creating humanities-inflected versions of workshops in project management, database design, historical GIS, data visualization, network analysis, and digital archives development. Joel Herndon, Director of Data and Visualization Services and his Visualization Specialists, Eric Monson and Angela Zoss, have written endorsements of the program.

Trinity Technology Services and the Office of Information Technology

The Digital Humanities Initiative and PhD Lab in Digital Knowledge at FHI are already building upon the initial efforts of individual labs and teams to work more closely with Trinity Technology Services, and the Office of Information Technology on workshops, training, and infrastructure development.

IV. STUDENTS AND MARKET ANALYSIS

A. SOURCES OF STUDENTS

Student interested in theoretical study of contemporary media, science, and art who has come of age in the digital environment and who has an intuitive sense that creative practice forms a dialectical correlate of theory and for whom the challenges of hands-on design and creation comprise a necessary resource for contemporary knowledge production. This student would have been an ideal candidate for theoretical programs in the Humanities (such as the Rhetoric Program at Berkeley, the Program in Comparative Culture and Media at Minnesota, the Program in Modern Culture and Media at Brown, or Duke's own Literature Program), but will flourish – and will be rewarded – by the opportunity to broaden her training to encompass not simply the courses and materials central to these kinds of programs, but also the discourses and practices that lie at the heart of design theory, scientific research, and artistic creation. This student will likely be drawn to an academic career and will be very opportunistically placed to develop new curriculum and modes of scholarship that integrate practice in substantive ways.

Student Characteristics

1. Student interested in a career in digital humanities with a media arts component who has come of age in the digital environment and has a conviction, likely the product of previous study in terminal degree programs (MA programs in art practice or architecture or design), that their creative practice would be much enhanced by the development of a cutting-edge, theoretically-driven research program. Whether the focus on such a research program is cognitive neuroscience or computer science, critical studies of media or informational capitalism, video game design and theory or the military-entertainment complex, this student seeks to introduce a well-grounded scholarly dimension to their practice that will enhance, guide, and generate their creative endeavors. This student may have aspirations to go on to a career in teaching and academic scholarship or may simply want to become a better, more critically engaged and sophisticated, artist.

2. Student with a strong interest and likely some substantial training in a scientific field (engineering, computer science, biological research, cognitive neuroscience, etc.) who wants to turn to the humanities and media arts for their culminating graduate studies and career trajectory. This student requires a program that will retrain her in methodologies of research in the theoretical humanities, and open new trans-disciplinary bridges for her to repurpose her scientific training for the purposes of cultural critique and artistic-creative production. This student will be perfectly positioned to seek an academic position in trans-disciplinary fields of research where her scientific background will be an asset. She will be equally well positioned for a career in the arts or the culture industries and media.

In terms of demand, even without recruiting we receive many applications every year through AAHVS and Literature who would be potentially suited to this program. Given that our enrollment targets are 1-2 students per year in the early stages of the program we anticipate having a strong pool of candidates to draw from right away.

Example 1: Incoming graduate student with Arts background

This student has an interest in the intersection of design, arts and neuroscience, and works on computer games as a medium, which has been researched by computer scientists, neuroscientists and game designers. The final project is a combination written thesis and art exhibition focused on neuro-aesthetics in theory and in practice.

Example 2: Incoming graduate student with Computer Science background

This student is a computer scientist, but has an interest in performance arts, cultural anthropology and video. The student takes courses from humanities departments while keeping his connections to Electrical and Computer Engineering. The result is multidisciplinary art performances that bring digital technologies, dance and critical thinking together.

Example 3: Incoming graduate student with Archeology background

This student has a background in archeology, but is also interested in how the use of digital technologies can transform research in the field. The student takes courses in Classics and Art History as well as studies virtual reality systems, programming, computer imaging, and 3D modeling. The result is a dissertation that combines numerous partial representations of an historic site into a layered virtual reality experience that facilitates both open-ended exploration by the public and hypothetical, annotated reconstruction scenarios for scholars.

Example 4: Incoming graduate student with Humanities background

This student has a background in a traditional humanities discipline such as English, Literature or Philosophy and is interested in how digital culture and modes of production can deepen research in the field by moving from a "close reading" to a "distant reading" (big data) approach to analysis of a given cultural domain. The student takes subject-area graduate methods and topics courses around the area of interest, as well as studies digital storytelling, humanities GIS, text analysis, data visualization, and Statistics. The result is a dissertation that demonstrates hidden connections and influences across time and space through interactive visualizations and a written explication.

B. COMPARISON OVERVIEW

Graduate programs in Media Arts with a scientific, computational or technological component roughly fall into three comparable categories: (1) graduate programs with a strong design, art, architecture and engineering component; (2) graduate programs with a strong computational, informatics, science and technology component; and (3) programs emerging from visual studies, visual arts, art history or media arts departments or schools .

From the 19 programs we have studied in detail, the Massachusetts Institute of Technology (MIT) *Media Arts and Sciences* is one of the oldest (28 years), only surpassed in age by the NYU Tisch School of the Arts and its *Interactive Telecommunication Program* (34 years). Compared to NYU, MIT is the undisputed leader in Media Arts and Sciences with its 25 research groups, 6 joint programs, 3 initiatives, at 163,000 sq.ft. facility and a multi-million dollar operating budget. They admit 30 to 40 students per year with a core faculty of 21. They cover many aspects of Media Arts and Sciences, mostly in project-based labs, which is a concept we have appropriated, scaled down and transformed

in Bays 11-10, Smith Warehouse. Equally inspirational to the Duke Computational Media, Arts & Cultures program is the connection between the labs and the media industry, which we also plan to engage in collaboration with the recently established MFA in Experimental and Documentary Arts (MFAEDA). MIT's insistence to promote an innovative culture that goes beyond known boundaries and disciplines also fits well within Duke's overarching trans-disciplinary culture. Finally, encouraging the most unconventional mixing of seemingly disparate research areas complemented by smaller programs in Art, Science and Technology and Advanced Visual Studies is an approach we would like to test as well.

The New York University *Interactive Communications Program* was founded in 1979 as part of the Tisch School of the Arts. In its 34 years of operations, it also has learned from the MIT example and its 13 core faculty has developed into a living community of technologists, theorists, engineers, designers, and artists, who are uniquely dedicated to pushing the boundaries of interactivity in the real and digital worlds. The program only grants a MPS (Masters of Professional Studies), which makes it less competitive in an arena where the PhD is increasingly becoming the norm. Another disadvantage of this program is that it is not university-wide and structured as a department, which has serious operational limitations we would not like to imitate. It is sometimes described as an art school for engineers or an engineering school for artists with the focus on hands-on approach to experimentation, production and risk-taking in a hi-tech environment. One aspect of the program we definitely would like to incorporate into ours is the experimental nature of the student projects and the program's explicit expectation that students are expected to invent a new field, along with their peers and faculty.

Well-established programs, such as the *Design Media Arts* at UC Los Angeles or the *Digital Media* program at Rhode Island School of Design RISD still operate on a MFA level, as do those offered at Ohio State (MFA *Art & Technology*), Parson New School of Design & Technology (MFA *Design & Technology*), California Institute of the Arts (MFA *Art & Technology*), and the University of Denver (MFA *Emergent Digital Practices*). Equally successful programs aspiring to transition between MFA and PhD are *Media Studies* at the University of Buffalo (PhD, MFA), *Art & Technology* at the University of Texas, Dallas (PhD, MFA), and *Electronic Arts* at Rensselaer Polytechnic Institute (PhD, MFA), among others.

California universities are among the most proactive in developing hybrid graduate programs with varying degrees of media art and technology components, such as *Design Media Arts* at UC Los Angeles (17 years; MFA), *Media Arts & Technology* at UC Santa Barbara (14 years; PhD, MS), and the concentration in *Media Studies* at UC San Diego, which emerged from the Department of Visual Arts (11 years; PhD, MFA). From all the California programs, we focused on UCLA and UCSB. *Design Media Arts* at the UCLA School of the Arts and Architecture has an incoming cohort of 12 students per year and a core faculty of 14. The program emerged out of a visual arts program (our category 3), which explains the MFA as final degree. More cutting-edge and advanced media arts and sciences research that has inspired Duke's Computational Media, Arts & Cultures Proseminar is taking place in the UCLA *Art/Sci Center.* The Center is not a degree granting entity, but it is connected to the *Design Media Arts* graduate program and is dedicated to pursuing collaborations between (media) arts and (bio/nano) sciences.

From all the UC programs, the *Media Arts and Technology Program* (MAT) at UCSB is perhaps the most unique trans-disciplinary and interdepartmental graduate degree program that offers PhD and Masters degrees and not the more traditional MFA, as discussed earlier. The program is comparable in size and university-wide reach to the Computational Media, Arts & Cultures program we propose

to implement at Duke, when taken alongside our AAHVS MA track in Computational Media. Also similar to our university-wide structure is the fact that the UCSB *Media Arts and Technology Program* is a trans-school program that is jointly administered by the College of Engineering and the College of Letters and Science.

What also drew our attention from the leading US programs we have studied in detail is their successful placement record (see *Sample Job Opportunities For Graduates From Other Programs*), one we definitely aspire to approximate at Duke. Such a placement record clearly demonstrates the robust and rising demand for Media Arts and Sciences graduate programs at the combined PhD and Masters level. The evidence for rising demand is also to be found in recently implemented programs in the category "Media Arts and Sciences," such as the program at the Arizona State University (4 years in operation). They have 11-core faculty in *Media Arts and Sciences*, with 18 PhD and 14 MA students in residence and recently added new media concentrations in at least 10 graduate degree programs.

C. PROGRAM COMPARISONS

INSTITUTION	DEPARTMENT	PROGRAM	DEGREES OFFERED			CORE FACULTY	PhD STUDENTS	MASTERS STUDENTS	STUDENTS ADMITTED/ YEAR	AVG. TIME (YEARS) COMPLETION PhD	# GRADUATE COURSES	YEARS IN EXISTENCE
Massachusetts Institute of Technology	School of Architecture & Planning	Media Arts and Sciences	PhD	MS		21	74	65	30-40	4	33	28
		Art, Culture & Technology		MS		5	N/A	7	6	N/A	23	4
Arizona State University	School of Art, Media + Engineering (in the Herberger Institute for Design & the Arts AND the Schools of Engineering)	Media Arts & Sciences	PhD		New Media concentrations in 10 graduate degree programs	11	18	14	4-5	5-6	13	4

	Herberger Institute for Design & the Arts	Design, Environment & the Arts	PhD				23	28	N/A	4-6	5-6	2 + 24 hours in electives in other programs	4
University of Washington	Center for Digital Arts & Experimental Media	Digital Arts & Experimental Media	PhD				7	16	N/A	3	3-5	31	9
University at Buffalo	Media Study	Media Study	PhD		MFA		10	5	25	2	4	26	2
	Visual Studies	Visual Studies	PhD		MA		19	5	6	1-2	6-7	29	3
University of California Santa Barbara	College of Engineering & College of Letters & Science	Media Arts & Technology	PhD	MS			8	21	8	10	5	37	14
Rhode Island School of Design	Digital + Media Department	Digital + Media			MFA		2 full-time, 12 part-time	N/A	31	25	N/A	17	11

University of Texas Dallas	School of Arts & Humanities	Arts & Technology	PhD		MFA		23	40	50	8-12	5	19	9
University of California Los Angeles	Design | Media Arts	Design | Media Arts			MFA		14	N/A	16	12	N/A	22	17
Brown University	Modern Culture & Media	Modern Culture & Media	PhD				16	15	N/A	2-3	5-6	70+	11
Illinois State University	College of Fine Arts	Arts Technology		MS			9	N/A	13	5-6	N/A	16	13
Rensselaer Polytechnic Institute	Department of the Arts	Electronic Arts	PhD		MFA		17	4	7	1	5-8	41	5
California Institute of the Arts	School of Art	Art & Technology			MFA		2	N/A	8-9	3-4	N/A	9	3
Parsons New School	School of Art, Media & Technology	Design & Technology			MFA		19	N/A	280	90	N/A	39	16
Indiana University	School of Informatics and Computing	Media Arts & Science		MS			13	N/A	25	20-30	N/A	11-12	14

Ohio State University	Department of Art	Art & Technology			MFA		6	N/A	7	3-4	N/A	10	14
University of Denver		Emergent Digital Practices			MFA MA		8	N/A	■	N/A	N/A	45	2
New York University	Tisch School of the Arts	Interactive Telecommunications Program				MPS (Master's of Professional Studies)	13	N/A	220	110	N/A	60	34
University of California San Diego	Department of Visual Arts	Art History, Theory, & Criticism	PhD		MFA	Concentration in Media Studies, Art Practice, & other areas	24	38	44	5-6	6	37	11
Institute of Advanced Media Arts & Sciences (IAMAS)	Media Creation	Media Creation				Master's	15	N/A	N/A	20	N/A	23	17

D. PROGRAM CHARACTERISTICS

INSTITUTION	DEPARTMENT	PROGRAM	FACILITIES & AFFILIATED CENTERS, LABS, ETC.	APPLICATION REQUIREMENTS	PhD REQUIREMENTS	NOTES
Massachusetts Institute of Technology	School of Architecture & Planning	Media Arts and Sciences	25 research groups, 6 joint programs, & 3 initiatives; List Visual Arts Center; Okawa Center for Future Children, 163,000 sq ft facilities	Online application, portfolios submitted as URL, statement of objectives, 3 letters of recommendation, official transcripts. *NOTE: The program only admits students at the Masters level (which usually takes 2 years) who then may go on to the PhD program (which typically takes 4 years)	Minimum of 3 semesters of residency beyond M.S. degree, qualifying exam (written & oral components), original research leading to a thesis & thesis defense. There is no "core curriculum." All graduate students are fully supported (tuition, medical insurance & stipend).	The program actively promotes a unique, anti-disciplinary culture & goes beyond known boundaries & disciplines, encouraging the most unconventional mixing of seemingly disparate research areas. It aims to design technologies for to create a better future & improve people's lives.

		Art, Culture & Technology	List Visual Arts Center	Online application, statement of objectives, official transcripts, 3 letters of recommendation	The minimum required residency for students enrolled in the SMACT program is two academic years. In addition to course & studio work, SMACT students submit a written thesis at the end of the program.	The program focuses on researched-based artistic practice, advanced visual studies and experimentation, and offers opportunities for trans–disciplinary relationships with other programs and labs at MIT.
			Center for Art, Science & Technology			MIT CAST facilitates & creates opportunities for exchange & collaboration among artists, engineers, & scientists. It is a joint initiative of the Office of the Provost, the School of Architecture & Planning (SA+P) and School of Humanities, Arts, & Social Sciences (SHASS). Activities include a visiting artists program, support, programs, & research.
			Center for Advanced Visual Studies			The program commissions & produces new artworks & artistic research within the context of MIT. A laboratory for interdisciplinary practice, the Center facilitates exchange between internationally known contemporary artists & MIT's faculty & students through public programs support for art projects, & residencies for MIT students.

Arizona State University	School of Art, Media + Engineering (in the Herberger Institute for Design & the Arts AND the Schools of Engineering)	Media Arts & Sciences	Technology Development Lab, Visual Media Lab, Sound Research Lab, Media Lab, Interdisciplinary Research Environment for the Motion Analysis (IREMA) initiative, The Design School, School of Art, ASU Art Museum	Online application, official transcripts, GRE scores, CV, Statement of Purpose, 3 letters of recommendation, portfolio (of digital media products, projects and/or publications)	39 course credit hours (minimum of 2 courses in each of the 5 areas of experiential media - 30 hours), 33 research hours, 12 dissertation hours, written comprehensive exam, prospectus & dissertation	The mission of the interdisciplinary program is to provide groundbreaking research & education on experiential media that integrate computation & digital media with the physical human experience. It has state of the art facilities for the development of media systems with focus on rehabilitation, K-12 education & enactive art.
	Herberger Institute for Design & the Arts	Design, Environment & the Arts	ASU Art Museum	Master's degree in Design or Architecture or Art History, online application, official transcripts, GRE scores, CV, Statement of Purpose, 3 letters of recommendation, written samples of papers/research	54 semester hours (30 course credit hours, 12 hours research, 12 hours dissertation, comprehensive exam, defense, dissertation, final exam	The program is an individualized, interdisciplinary degree with concentrations in: design; digital culture; history, theory & criticism; healthcare & healing environments. It's a cutting edge program involving multidisciplinary research in design & the arts.

University of Washington	Center for Digital Arts & Experimental Media	Digital Arts & Experimental Media	School of Art, Art Library, Meany Hall for Performing Arts, Fab Lab, computer lab, sound lab, video lab, graduate workspace	Master's degree in related field recommended, portfolio in digital format, statement of purpose, competence in computing, technology literacy, and skill & imagination in area of interest, application form, official transcripts, CV & biography, 3 letters of recommendation	90 credits (including 6 quarters of full-time study, DXARTS 500 required each quarter, 60 credits of DXARTS courses, at least 30 credits at the 500 level), minimum 3.0 GPA in DXARTS courses, general exam, final project, final examination	The program embraces art practice, theory, & research across disciplines. While creating new art is at the center of all activities of the program, it is a research-oriented degree for artists & scholars who are pioneers of a new era in the arts.
University at Buffalo	Media Study	Media Study	Editing labs, digital stations, computer labs, audio labs	Online application, transcripts, GRE scores, URL to personal website with portfolio materials, CV, 2 writing samples, statement of research interests & abilities, 3 letters of recommendation, $75 application fee	Most of the credits are earned in research & independent study. Five foundational courses (2 of Methods of Making I/II/III, PhD Seminar I & II, Research Ethics) are required. Students will typically be ready for their qualifying exams at the end of their fourth semester & then dedicate themselves exclusively to the dissertation with supervision of a faculty member, in	This program responds to the rapid development & transformation of media due to advances in information technologies & to the growing number of artist-scholar-researchers working in technology-based art forms. A new community of artist-scholar-researchers has emerged in the spaces between media art practice, the sciences, and the humanities. The PhD in Media Study seeks to nurture the next generation of artist-scholars & assist them as they seek to define new art & research practices of the 21st century. Students develop with faculty supervision their research specialties & formulate deep individualized research trajectories in cutting edge media theory & practice.

				consultation with a self-defined dissertation committee with expertise in the areas of the student's research. Select PhD students are financially supported for four years and expected to contribute to the department through teaching and instructional support.	
Visual Studies	Visual Studies	Art Resource Center, Media Resource Media, Laser Cut Lab, Audio Lab, Photo Labs, Computer Labs, Painting & Drawing Studios, Print Studio, Sculpture Studio	Bachelor's degree with at least 3.5 GPA, online application, resume, statement of intent, work sample, official transcripts, 3 letters of recommendation	All students receive a full tuition scholarship for at least three years, as well as living expenses & health care, in exchange for teaching & research responsibilities.	Integrating art history, histories of the image, & critical theory, this program offers a course of study in visual culture that effaces traditional disciplinary boundaries. It's a highly rigorous doctorate with the traditional emphasis on research & writing.

University of California Santa Barbara	College of Engineering & College of Letters & Science	Media Arts & Technology	11 labs including: Center for Research in Electronic Art Technology, Allosphere Research Facility & Research Center for Virtual Environments & Behavior, Dept of Art, Dept of Film & Media Studies, Department of History of Art & Architecture, Art Library, University Art Museum	Bachelor's or Master's degree in a related field, online application, online portfolio with examples of both creative & technical work, official transcripts, GRE scores, statement of purpose, resume, 3 letters of recommendation	MAT students may focus on specific areas of emphasis, according to their backgrounds & career interests. 5 core courses are required, plus elective courses dependent upon area of emphasis, qualifying exam, proposal, dissertation & defense	The program serves as a focal point for education, research, & artistic production in digital media, with special emphases in visual & spatial arts, electronic music & sound design, & multimedia engineering. The curriculum provides for an interdisciplinary experience with an emphasis on research & collaboration in digital media systems, content, & interaction. MAT is designed to provide its students with knowledge & skills relevant to careers in digital media-related research, teaching, and leadership.

| Rhode Island School of Design RISD | Digital + Media Department | Digital + Media | Brown University's Department of Modern Culture & Media, 3D scanning facilities, 2 Mac labs, installation rooms | transcripts, portfolio of 20 examples of work (submitted via Slideroom or CD/DVD), statement of purpose, 3 letters of recommendation | | N/A | The program involves interdisciplinary exploration in the realms of art, technology & society. It includes a central curriculum, high-level collaboration, & team-based artistic practice & research. The goal of the department is to support leading edge artistic research & practice, focusing on the creative potentials of technological media. The departmental curriculum is informed by the fields of art, media theory, computer science, engineering, social theory, political theory, cultural studies & environmental studies among others. The department itself participates in continually evolving the articulation of situated art, technology & society research & practice. It fosters exploratory work that seeks to exhibit a high degree of innovative expression, conceptual clarity, & technological insight & skill. The continuum between physical space & virtual space is emphasized. We help prepare artists and cultural producers to evaluate & understand the functions of their work within the range of contexts involved. |

University of Texas Dallas	School of Arts & Humanities	Arts & Technology	STEAM Initiative, Center for Interdisciplinary Studies in Museums, 155,000 sq ft facilities	Master's degree in appropriate field, advanced computer programming courses, at least 3.5 GPA in graduate level courses, 3 letters of recommendation, admissions essay (on interests & goals), portfolio	Minimum of 60 semester hours (42 hours in coursework & 19 hours in dissertation), doctoral field examination, dissertation	Emphasis is on theory & practice. The program is designed to explore the convergence of computer science & engineering with the creative arts & the humanities. Areas include animation, interactive design, interactive games, virtual environments, & sound design.
University of California Los Angeles	Design | Media Arts	Design | Media Arts	UCLA Game Lab, Art/Sci Center, Facilities: Broad Art Center, video lab, digital audio facilities, fabrication lab, electronics lab, print lab, photo & video production lab, 8 faculty research labs, Wright Gallery	transcript, statement, portfolio, 3 references (not letters of recommendation), interview for finalists	N/A	The Program offers a comprehensive, multidisciplinary approach to media creation that fosters individual exploration & innovative thinking. Within the context of the department, design is a process & way of thinking, and media arts foreground experimental media creation. The results emerge in/on books, galleries, game consoles, installations, films, magazines, performances, public spaces, televisions, & websites. We strive to create socially & culturally relevant objects, experiences, & spaces
			Art/Sci Center + Lab			Focus on the collaborative potential between media arts and the bio/nano sciences

			Children's Digital Media Center			This center studies children, teens, & young adults' interaction with newer forms of interactive digital media, examining how these interactions affect offline lives & long-term development.
Brown University	Modern Culture & Media	Modern Culture & Media	Malcolm Forbes Center, Cine-transfer Station, McColl Studios for Electronic Music, Instructional Project Development, 2 multimedia labs production facilities, screening rooms	Application form, 3 letters of recommendation, personal statement, writing sample, official transcripts, & GRE scores	Minimum of 13 courses (exclusive of any taken solely to fulfill the foreign language requirement), individualized plans of study, at least one graduate course offered by the Department is required in each of the following three areas: Theory, Textual Analysis, & Historical/Cultural Locations.	The program is committed to the study of media in the context of the broader examination of modern cultural & social formations. Our curriculum stresses comparative analysis & theoretical reflection & highlights the integration of theory & practice, creative thought & critical production. MCM combines the analysis of diverse texts with the study of contemporary theories of representation & cultural production & creative practice in a range of media.
			Granoff Center for the Creative Arts, 38,815 sq ft			Includes the Khoo Teck Puat Multimedia Lab (which has equipment & software to allow students & faculty to create freely & stretch the boundaries of art & technology) & the Cogut Physical Media Lab (for production of & research in sensors, robotics, & physical computing, primary areas of new research & teaching in the arts.)

Illinois State University - Arts Technology	College of Fine Arts	Arts Technology	6 computer labs, digital studio	Resume, letter of application stating interest in program & what student wishes to emphasize in work, writing sample, online portfolio (6-10 pieces of work: 2D, 3D, video, animation, sound, web design, etc)	N/A	This program emphasizes theory, design, & practice in the application of computer technology to art, music, & theatre. It provides training in digital technology to artists & advertises that little pre-requisite knowledge is needed. ISU also has a Master's program in Visual Culture.
Rensselaer Polytechnic Institute - Electronic Arts	Department of the Arts	Electronic Arts	Computer Music Lab, Video Lab, Media Lab, 6 studios, Experimental Media & Performing Arts Center	Master's degree, online application, statement of background & goals, research proposal, online portfolio (demonstrating a research-based & interdisciplinary creative practice), resume, scholarly writing sample, official transcripts, 2 letters of recommendation	Minimum 60 credit hours (minimum of 18 credit hours for dissertation research), shows, candidacy exam, dissertation proposal, dissertation, dissertation oral defense. Generally takes 4 years to complete.	An interdisciplinary program integrating research & art practice using the full range of electronic media in areas including social activism, gaming, bioart, documentary video, immersive environments, performance art, and more. The curriculum focuses on creative practice that is informed by coursework, advisors, & culminates in a dissertation.

California Institute of the Arts	School of Art	Art & Technology	Center for Integrated Media, Facilities: Studios, Mac Lab, Photo Lab, Print & Media Lab, Super Shop, Video Lab, Galleries	Interview, transcripts, letters of recommendation, artist statement, portfolio of 20 examples of work	N/A	The program is designed to encourage students to cultivate creative strategies, technical competencies & critical thinking skills leading to the exploration & development of new applications of technology & media in contemporary art practices. Students explore new technologies while developing a critical point of view regarding the social & political aspects of contemporary culture & the role that technology plays within it. The curriculum is centered around both a studio-based practice & an exchange of dialogue with students, visiting artists & faculty. It offers technical instruction in the creative use of technology, including computer programming, web-based systems, digital image making, digital sound design, immersive installation, digital video, interactive multimedia & hybrid performance. Critiques & seminars challenge conventional ideas about what constitutes an art practice in today's contemporary culture.

| Parsons New School - Design & Technology | School of Art, Media & Technology | Design & Technology | PETLab (Prototyping Evaluation, Teaching & Learning lab), SMALLab (Situated Multimedia Art Learning Lab), SpyLab (new media research collective developed by AMT Dean Sven Travis that unites Parsons artists with peers in Beijing), Eyebeam Art & Technology Center | transcripts, resume, statement of interest & intentions, 2 letters of recommendation, portfolio, interview | N/A | The two-year, 60-credit program provides students with a dynamic environment in which to use design research, process, applied theory, & writing to address challenges. Students push their experimentation beyond the visual: Design is seen as a mechanism for developing strategies, knowledge organization, business structures, & social consciousness. Faculty members, who are active design practitioners, encourage students to pursue forward-looking, creative, commercial, research-based, educational, & art-based career paths. Through collaborations with industry partners, other universities, & not-for-profit organizations, students make award-winning design projects & exhibit at venues worldwide. |
| Indiana University | School of Informatics and Computing | Media Arts & Science | Frank and Katrina Basile Center for Art, Design and Public Life; Virtual Reality Theater, 6 computer labs, digital audio studio | resume, transcripts, personal statements, 3 letters of recommendation, portfolio for those with background in visual media, other applicants should provide examples of academic writing, software developed, etc | N/A | The program focuses on necessary skills for professional development. Training is provided in new media, visualization, programming, theory & design. Focus is on building a portfolio as a showcase for prospective employers. |

			UITS Advanced Visualization Lab (AVL)			Staff provide expert consulting, support, & technology for scientific visualization, virtual reality, high-end computer graphics, & visual tele-collaboration.
			Informatics Research Institute			The IRI conducts research in capturing, managing, analyzing, & visualizing information & knowledge across a wide array of application areas. It researches policy & socioeconomic issues arising from information technology & informatics applied to areas such as Human Computer Interaction, Health, Medicine, Biology, Chemistry & the Fine Arts.
Ohio State University	Department of Art	Art & Technology	Facilities: New Media Robotics Lab, New Media Bio Art and Gaming Lab, Fergus Gilmore Computer Studio, Dimensional Imaging Research Lab; Collaborates with: Wexler Center for the Arts, Battelle Endowment for Technology & Human Affairs, Holography Laboratory	portfolio of 15-20 still images or 20 min of interactive or time-based work, CV, statement of intent, 3 recommendation letters, transcripts	N/A	Admissions website only has information for entire MFA program, doesn't differentiate Art & Technology

			(administered by Physics Dept)			
			Advanced Computing Center for Art & Design (ACCAD)			The ACCAD is a transdisciplinary & collaborative think space, where research centers on the use & integration of emerging arts technologies. It functions as a collaborator for media production, & contains studios for animation, motion capture, interactive design, & media production.
University of Denver		Emergent Digital Practices	The Hypercube, The Cloud, The Lab, The Node, make spaces, computer lab, teaching lab, digital audio-video editing studio, printmaking studio, sculpture studio	Official transcripts, 3 letters of recommendation, personal statement, resume, portfolio, online application *Not accepting new students!	N/A	The program fuses the former programs of Digital Media Studies & Electronic Media Arts & Design. It brings together art, design, media, culture, & technology studies in a hands-on, collaborative environment. Technology links academic disciplines with professional fields & joins shared communities in new ways. To understand & explore this landscape, the program infuses the digital practices of making with contemporary critical approaches to cultural technologies, media philosophy, critique & investigation of new media arts, & studies in politics & science.

Institution & Program	# Core Faculty	# PhD Students	# Masters Students	# Students / Year	Avg time to complete PhD	# Graduate Courses	Years in existence
Arizona State University							
Media Arts & Sciences	**11**	**18**	**14**	**4-5**	**5-6**	**13**	**4**
Design, Environment & the Arts	**23**	**28**	**N/A**	**4-6**	**5-6**	**2**	**4**
Brown University							
Modern Culture & Media	**16**	**15**	**N/A**	**2-3**	**5-6**	**70+**	**11**
California Institute of the Arts							
Art & Technology	**2**	**N/A**	**8**	**3-4**	**N/A**	**9**	**3**
Illinois State University							
Arts Technology	**9**	**N/A**	**13**	**5-6**	**N/A**	**16**	**13**
Indiana University							
Media Arts & Science	**13**	**N/A**	**25**	**20-30**	**N/A**	**11**	**14**
Institute of Advanced Media Arts & Sciences (IAMAS)							
Media Creation	**15**	**N/A**	**N/A**	**20**	**N/A**	**23**	**17**

Massachusetts Institute of Technology

Media Arts & Sciences	**21**	**74**	**65**	**30-40**	**4**	**33**	**28**
Art, Culture & Technology	**5**	**N/A**	**7**	**6**	**N/A**	**23**	**4**

New York University

Interactive Telecommunications	**13**	**N/A**	**220**	**110**	**N/A**	**60**	**34**

Ohio State University

Art & Technology	**6**	**N/A**	**7**	**3-4**	**N/A**	**10**	**14**

Parsons New School

Design & Technology	**19**	**N/A**	**280**	**90**	**N/A**	**39**	**16**

Rensselaer Polytechnic Institute

Electronic Arts	**17**	**4**	**7**	**1**	**5-8**	**41**	**5**

Rhode Island School of Design

Digital + Media	**14**	**N/A**	**31**	**25**	**N/A**	**17**	**11**

University of Buffalo

Media Study	**10**	**5**	**25**	**2**	**4**	**26**	**2**

University of California Los Angeles

**Design	Media Arts**	14	N/A	16	12	N/A	22	17

University of California San Diego

Art History, Theory & Criticism	24	38	44	5-6	6	37	11

University of California Santa Barbara

Media Arts & Technology	8	21	8	10	5	37	14

University of Denver

Digital & Media Studies	8	N/A		N/A	N/A	45	2

University of Texas Dallas

Arts & Technology	23	40	50	8-12	5	19	9

University of Washington

Digital Arts & Experimental Media	7	16	N/A	3	3-5	31	9

AVERAGE:	13	26	51	19	5	28	11.5

Number of Core Faculty in MAS Graduate Programs

Institution & Program	# of Core Faculty
Arizona State University	
Media Arts & Sciences	**11**
Design, Environment & the Arts	**23**
Brown University	
Modern Culture & Media	**16**
California Institute of the Arts	
Art & Technology	**2**
Illinois State University	
Arts Technology	**9**
Indiana University	
Media Arts & Science	**13**
Institute of Advanced Media Arts & Sciences (IAMAS)	**15**
Media Creation	
Massachusetts Institute of Technology	
Media Arts & Sciences	**21**
Art, Culture & Technology	**5**
New York University	
Interactive Telecommunications Program	**13**

Ohio State University

> **Art & Technology**   6

Parsons New School

> **Design & Technology**   19

Rensselaer Polytechnic Institute

> **Electronic Arts**   17

Rhode Island School of Design

> **Digital + Media**   14

University of Buffalo

> **Media Study**   10

University of California Los Angeles

> **Design | Media Arts**   14

University of California San Diego

> **Art History, Theory & Criticism**   24

University of California Santa Barbara

> **Media Arts & Technology**   8

University of Denver

> **Digital & Media Studies**   8

University of Texas Dallas

> **Arts & Technology**   23

University of Washington

> **Digital Arts & Experimental Media**   7

AVERAGE: **13**

Number of Students in MAS Graduate Programs

Institution & Program	# PhD Students	# Master's Students
Arizona State University		
Media Arts & Sciences	**18**	**14**
Design, Environment & the Arts	**28**	**N/A**
Brown University		
Modern Culture & Media	**15**	**N/A**
California Institute of the Arts		
Art & Technology	**N/A**	**8**
Illinois State University		
Arts Technology	**N/A**	**13**
Indiana University		
Media Arts & Science	**N/A**	**25**
Institute of Advanced Media Arts & Sciences (IAMAS)		
Media Creation	**N/A**	**N/A**
Massachusetts Institute of Technology		
Media Arts & Sciences	**74**	**65**
Art, Culture & Technology	**N/A**	**7**
New York University		

Interactive Telecommunications Prog.	N/A	220
Ohio State University		
Art & Technology	N/A	7
Parsons New School		
Design & Technology	N/A	280
Rensselaer Polytechnic Institute		
Electronic Arts	4	7
Rhode Island School of Design		
Digital + Media	N/A	31
University of Buffalo		
Media Study	5	25
University of California Los Angeles		
**Design	Media Arts**	N/A	16
University of California San Diego		
Art History, Theory & Criticism	38	44
University of California Santa Barbara		
Media Arts & Technology	21	8
University of Denver		
Digital & Media Studies	N/A	
University of Texas Dallas		
Arts & Technology	40	50
University of Washington		

Digital Arts & Experimental Media	**16**	**N/A**
AVERAGE:	**26**	**51**

Number of Students Admitted per Year in MAS Graduate Programs

Institution & Program	# of Students Admitted/Year
Arizona State University	
Media Arts & Sciences	**4-5**
Design, Environment & the Arts	**4-6**
Brown University	
Modern Culture & Media	**2-3**
California Institute of the Arts	
Art & Technology	**3-4**
Illinois State University	
Arts Technology	**5-6**
Indiana University	
Media Arts & Science	**20-30**
Institute of Advanced Media Arts & Sciences (IAMAS)	
Media Creation	**20**
Massachusetts Institute of Technology	
Media Arts & Sciences	**30-40**
Art, Culture & Technology	**6**

New York University

    Interactive Telecommunications   **110**
Program

Ohio State University

    Art & Technology   **3-4**

Parsons New School

    Design & Technology   **90**

Rensselaer Polytechnic Institute

    Electronic Arts   **1**

Rhode Island School of Design

    Digital + Media   **25**

University of Buffalo

    Media Study   **2**

University of California Los Angeles

    Design | Media Arts   **12**

University of California San Diego

    Art History, Theory & Criticism   **5-6**

University of California Santa Barbara

    Media Arts & Technology   **10**

University of Denver

    Digital & Media Studies   **N/A**

University of Texas Dallas

    Arts & Technology   **8-12**

University of Washington

Digital Arts & Experimental Media	**3**

AVERAGE: **19**

Average Time for Completion of PhD in MAS Programs (in years)

Institution & Program	Average time for Completion of Ph.D.
Arizona State University	
Media Arts & Sciences	**5-6**
Design, Environment & the Arts	**5-6**
Brown University	
Modern Culture & Media	**5-6**
California Institute of the Arts	
Art & Technology	**N/A**
Illinois State University	
Arts Technology	**N/A**
Indiana University	
Media Arts & Science	**N/A**
Institute of Advanced Media Arts & Sciences (IAMAS)	**N/A**
Media Creation	
Massachusetts Institute of Technology	

Media Arts & Sciences	**4**
Art, Culture & Technology	**N/A**

New York University

Interactive Telecommunications Program	**N/A**

Ohio State University

Art & Technology	**N/A**

Parsons New School

Design & Technology	**N/A**

Rensselaer Polytechnic Institute

Electronic Arts	**5-8**

Rhode Island School of Design

Digital + Media	**N/A**

University of Buffalo

Media Study	**4**

University of California Los Angeles

**Design	Media Arts**	**N/A**

University of California San Diego

Art History, Theory & Criticism	**6**

University of California Santa Barbara

Media Arts & Technology	**5**

University of Denver

Digital & Media Studies	**N/A**

University of Texas Dallas

> **Arts & Technology**   **5**

University of Washington

> **Digital Arts & Experimental Media**   **3-5**

AVERAGE: **5**

Number of Graduate Courses in MAS Graduate Programs

Institution & Program	# Graduate Courses
Arizona State University	
Media Arts & Sciences	**13**
Design, Environment & the Arts	**2**
Brown University	
Modern Culture & Media	**70+**
California Institute of the Arts	
Art & Technology	**9**
Illinois State University	
Arts Technology	**16**
Indiana University	
Media Arts & Science	**11**
Institute of Advanced Media Arts & Sciences (IAMAS)	**23**

Media Creation

Massachusetts Institute of Technology

Media Arts & Sciences	**33**
Art, Culture & Technology	**23**

New York University

Interactive Telecommunications Program	**60**

Ohio State University

Art & Technology	**10**

Parsons New School

Design & Technology	**39**

Rensselaer Polytechnic Institute

Electronic Arts	**41**

Rhode Island School of Design

Digital + Media	**17**

University of Buffalo

Media Study	**26**

University of California Los Angeles

**Design	Media Arts**	**22**

University of California San Diego

Art History, Theory & Criticism	**37**

University of California Santa Barbara

Media Arts & Technology	**37**

University of Denver

    Digital & Media Studies   45

University of Texas Dallas

    Arts & Technology   19

University of Washington

    Digital Arts & Experimental Media   31

AVERAGE: **28**

Number of Years in Existence for MAS Graduate Programs

Institution & Program	Years in Existence
Arizona State University	
Media Arts & Sciences	**4**
Design, Environment & the Arts	**4**
Brown University	
Modern Culture & Media	**11**
California Institute of the Arts	
Art & Technology	**3**
Illinois State University	
Arts Technology	**13**

Indiana University

| **Media Arts & Science** | **14** |

Institute of Advanced Media Arts & Sciences (IAMAS)

17

Media Creation

Massachusetts Institute of Technology

| **Media Arts & Sciences** | **28** |
| **Art, Culture & Technology** | **4** |

New York University

| **Interactive Telecommunications Program** | **34** |

Ohio State University

| **Art & Technology** | **14** |

Parsons New School

| **Design & Technology** | **16** |

Rensselaer Polytechnic Institute

| **Electronic Arts** | **5** |

Rhode Island School of Design

| **Digital + Media** | **11** |

University of Buffalo

| **Media Study** | **2** |

University of California Los Angeles

| **Design | Media Arts** | **17** |

University of California San Diego

> **Art History, Theory & Criticism**   **11**

University of California Santa Barbara

> **Media Arts & Technology**   **14**

University of Denver

> **Digital & Media Studies**   **2**

University of Texas Dallas

> **Arts & Technology**   **9**

University of Washington

> **Digital Arts & Experimental Media**   **9**

AVERAGE: **11.5**

E. CAREER OUTCOMES

University of California Santa Barbara (14 years / incoming cohort 10 / faculty 8)

Media Arts & Technology Program, PhD, MS

A degree in MAT opens new possibilities for students from traditional disciplines, allowing them to continue in their field (with an important new interdisciplinary perspective) or to branch out on a different path. Media Arts and Technology graduates move on to a wide variety of positions in industry, academia, government, and private practice as researchers, engineers, software developers, designers, artists, faculty members, and more. Many MAT Master's students have gone on to PhD programs at UCSB and elsewhere. They have MAT alumni working in the computing industry, in audio companies, in the music business, in startup companies, and as practicing artists.

UCSB graduates hold academic/artistic positions at numerous schools and institutes. Some of these include:

- Beijing Central Conservatory of Music
- California Polytechnic State University, San Luis Obispo
- DAAD (Deutscher Akademischer Austausch Dienst, German Academic Exchange Service),

Berlin
- Korea Advanced Institute of Science and Technology (KAIST)
- Lasalle College of the Arts, Singapore
- Sogang University, Seoul
- University of Aalborg, Denmark
- University of Akron, Ohio
- University of Arizona, Tucson
- York University, Toronto

University of Texas at Dallas (9 years / incoming cohort 8-12 / faculty 23)

Arts & Technology, PhD, MFA

Possible Careers:

- Digital Art Designer
- Digital Curator
- Software Producer
- Production Manager
- Teacher

Various positions in Media Publishing-Broadcasting, Digital Sound & Music
PhD-Tenure line faculty positions in colleges and universities; Digital content, mobile application and software design; Researcher in computer science applied to digital media; Human to computer interface researcher

New York University (34 years / incoming cohort ? / faculty 13)

Interactive Telecommunications Program, MPS (Masters of Professional Studies)

ITP graduates hold such job titles as:

- Creative Director, Frog Design
- Director of Strategic Planning, Digital Media, Microsoft Corporation
- Senior Creative Director, IBM.com
- Senior Vice President of Marketing, Infinium Labs
- Director of Interactive Media, WNYC New York Public Radio
- Director of New Media, Minnesota Public Radio
- Digital Media Manager, American Museum of the Moving Image
- Manager: Wireless Services, eSolutions, Sony Electronics
- Executive Producer, R/GA
- Producer of teenpeople.con, Time Interactive
- Advanced Educational Systems, NYU School of Medicine
- Multimedia Manager, IFC Digital Media (Independent Film Channel)
- Production Manager of Multimedia, MTV Networks Creative Services
- Project Manager, National Palace Museum, Taipei, Taiwan
- Senior Director of Business Development & E-Commerce Operations, Nickelodeon Online
- Senior Director of Global Content, Office Depot
- Director of Technology, Arts Engine, Inc.

- Co-Founder and Managing/Creative Director, illumiSPACE (Taipei, Taiwan)
- Chairperson, A.I. Republic (Taipei, Taiwan)
- Head of Broadband Team, Times of India group, indiatimes.com
- Director of Math, Science and Technology at a center for education and reform
- Director of Project Development, NBC Universal
- Vice President, Technology, Huffington Post
- VP of Engineering, GroundedPower
- VP/ Group Program Director, Moxie Interactive
- Director of Research and Development, Media Innovations
- Vice President, Senior Producer, area/code
- VP, Executive Experience Director, Crispin Porter + Bogusky
- Executive Director, Asia Society Online
- Co-founder, Foursquare
- Fonder and CEO, NetInformer Corp.
- Principal, Local Projects
- Co-Founders, WholeNote
- CEO and Co-Founder, Networked Organisms, LLC
- Co-Founder, BeeMe
- Co-Founder, fabrickit
- Founder, Uncommon Projects
- CMO, Partner, Co-Founder, Sustainably Minded Interactive Technology
- Founder, Cool Hunting
- Co-Founder, Antenna Design
- Interactive Designer, American Museum of Natural History
- Interaction Designer of R&D and Asst Director, Media Innovations (Mexico City)
- Interaction Designer, ESI Design
- Interaction Design Researcher, People & Practices Group, Intel Research
- Senior Interaction Designer, R/GA
- Freelance Art Director, Designer, Interaction Designer – small design boutiques firms, startups, bigger ad agencies.
- Interaction Designer Edwin Schlossberg Inc
- Interaction Designer, Google
- Interaction Designer, Antenna Design
- User Experience Specialist, Nielsen Norman Group
- UX designer at Code and Theory
- IA and Usability Consulting
- UX Designer, Cisco
- Lead User Experience Designer, Method
- Senior User Experience Designer, Snapfish
- Director of User Experience, WebMD
- Director of User Experience, Gilt Groupe
- Senior UX Designer at a small interactive agency in Brooklyn that works mostly with foundations, non-profits, and educational organizations.
- Senior User Experience Designer, LBi
- User Experience Designer, Razorfish
- Senior User Experience Designer, Scholastic

- Senior Designer/ Project Lead, IDEO
- Senior Designer, Pentagram Design
- Systems and Graphic Designer, Shiseido
- Designer, AvroKo
- Senior Product Designer at Apple
- Design Lead at Nokia's Research Center
- Visual Designer, Yahoo!
- Lead Designer, Nokia
- Multimedia Developer for Public Exhibitions, San Francisco Exploratorium
- Exhibit Technician, New York Hall of Science
- Designer of a new science centre to be opened in Calgary, Alberta, Canada
- Designer of an installation for a new engineering building at the University of Waterloo
- Multimedia and Interactive Installation Designer, mainly for museums
- Education Technology Specialist, Natural History Museum of Los Angeles
- Professor, Meisei University, Tokyo, Japan
- Assistant Professor at Parsons School of Design
- Tenured Professor, Chair of media arts, New Mexico Highlands University
- Associate Chair, Integrated Design Curriculum, Parson's School of Design
- Full-Time Faculty, Kansas City Art Institute
- Resident, Microsoft Asia (Beijing)
- IT Solutions Group, TBWAChiatDay
- Film Festival Coordinator, Asian Cinevision
- Content Strategist, Ogilvy Interactive
- Artistic Director, New York Dance & Arts Innovations
- Artist Resident, Eyebeam Art + Technology Center
- Director, Web Analytics, The New York Times
- Coordinator for the development of a Wi-Fi mesh network for Franklin D Roosevelt Four Freedoms Park (opening 2012)
- Game Designer and Programmer, gameLab
- Mobile Software Developer at R/GA
- Mobile and Advanced TV Project Developer at NBC Universal
- Web/Community Manager for AIGA
- Open Source Project, competinghypotheses.org
- Video Designer / Systems and Software Programmer for live-performance video, The Builders Association
- Media Director for 3LD Art & Technology Center
- Senior Technical Producer for the Asia Society
- Creative Developer, Apple
- After-school programs for young people in technology, creative digital media, Vision Education & Media
- Frontline documentary called Digital Nation
- Interactive Producer developing content and strategies for multiplatform productions
- Small Mobile Prototyping Group at Yahoo!. Mobile.
- Web Producer at BBC
- Research & Development, Kickstarter
- Interactive Designer, Bloomberg

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- Software Developer, Potion Design
- Programming Director, The Tank
- Director of Mobile and Social Media, Omnigon
- Lead Creative Programmer, BBI Engineering
- Recording Artist, Anticipate Recordings
- Senior Project Manager, Oracle
- Media Technology Developer, Museum of Modern Art
- Kinetic Lighting Designer, Founder, Jason Krugman Design Studio
- Senior New Media Advisor, eDiplomacy, State Department
- Director, The WildLab
- User Interface Designer, Samsung Electronics
- Account Director, StrawberryFrog
- Program Manager, Microsoft FUSE Labs
- Senior Insights Researcher – Yahoo!
- Freelance Art/Creative Director, BBD

V. RESOURCES NEEDED FOR THE PROGRAM

A. BUSINESS PLAN AND PROGRAM EXPENSES

This is a small-scale, experimental program at the outset. Current resources include the balance of the expendable Mellon Visual and Media Studies PhD grant of more than $500,000, the endowment under the same Mellon award of $600,000, a matching endowment of $600,000 from The Duke Endowment, plus a funding commitment from Arts & Sciences tied to MA student enrollments in AAH&VS. Costs beyond staffing are primarily associated with graduate student tuition and stipends, as we already have the infrastructure and staff in place to support the program.

The budget described below assumes income from the MA track in Historical and Cultural Visualization at the level of 3 students per year participating in a 3 semester MA program, with the number of MA students enrolling per year gradually increasing to 6 incoming students by FY21. Actual enrollments in the PhD program would depend upon projected revenues from the MA and other sources, such as grants and other external resources. This budget reflects 1-0-1-0-1 students enrolling in the PhD in its first five years. We may increase to 1-2-1-2-1 if we have sufficient funding via the MA and other sources to support it.

Students already enrolled in the transitional Visual and Media Studies track of the Art, Art History & Visual Studies PhD are reflected in the numbers below. They are being funded out of a combination of Mellon expendable funds and existing commitments from A&S. They would become part of the CMAC cohort.

Administrative staff noted in the budget are already in place in AAHVS. We are assuming a no-cost-extension (NCE) on the existing Mellon expendable grant.

IT Staff support is also listed as part of the Mellon expendable funds. Transitional IT and web support have been maintained through limited contracts and a shared appointment, which recently ended. The remaining expendable funds are allocated to web and IT support as noted, also assuming a NCE. We are currently exploring shared IT support models across programs and labs to stretch these resources further.

Given the small size of the cohort, we anticipate some of the graduate students' incidental and research expenses being supported through The Digital Humanities Initiative in FHI, and through Information Science + Studies endowments. This should offset any modest shortfalls in the budget as noted. As students become partners in FHI Labs, Bass Connections projects, and other initiatives such as Data + in the Humanities, we anticipate possible TAships and other support opportunities coming to our PhD students as well.

B. RESOURCES AVAILABLE

Staffing:
- **.25 FTE Contribution towards AAHVS and ISS:** We currently are supporting .25 FTE of administrative support via the Mellon expendable funds. This FTE goes towards support of the administrative staff in AAHVS, which includes a Business Manager and DGSA. These funds will be available for at least the first two years of the program. We will pursue interdepartmental collaborations for further graduate support, as well as internal and

external grant-funded teaching and research opportunities around specific faculty research within the Labs in Smith, FHI, Information Science + Studies, and around campus through Bass Connections and other initiatives. As noted earlier, we also plan to support the Graduate Certificate in Computational Media, Arts & Cultures through the existing Information Science + Studies program as a way for interested students from other programs to serve as a larger cohort. ISS staff support, which is also provided in partnership with AAHVS, will be available for lab, curricular, and co-curricular support.

- **1 FTE IT Support/Web Development**: FHI Technology and Administrative Staff will continue to assist with the Digital Humanities Initiative and PhD Lab activities. If this program is approved their support will extend to CMAC PhD activities as well.

Budget Scenarios

- The most conservative budget scenario assumes no additional revenues from the MA in Computational Media, and relies upon resources coming from Mellon, Mellon Matching funds from Duke Development, and funds reserved from the prior Visual Studies Initiative grant. This scenario relies on Mellon expendable funds to support staffing and other program needs during the startup phase of the formal PhD. These administrative staff are already in place in AAHVS, as noted above.

- The second budget scenario assumes income from the Computational Media track in the AAHVS MA in Historical and Cultural Visualization (to be renamed to Digital Art History/Computational Media on final approval). This second scenario brings in 1-2-1-2-1 graduate students over a five year period.

Should we acquire additional funds to support the program through external grants, graduate lines contributed through new programmatic partners, etc., we would consider slightly expanding number of PhD students admitted in a given year, but we expect the program to remain small, and manageable with existing faculty, staff, and infrastructure resources. The CMAC Graduate Certificate will serve the wider community of graduate students interested in participating in our activities from within existing disciplinary formations and structures.

Endowment Returns

Assuming avg. 8% annual return (per Beth Eastlick)				**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
	Base	FY14	FY15	FY16	FY17	FY18	FY19	FY20
VSI principal (actual FY14-15)	3.50%	$675,630	$675,630	$699,277	$723,752	$749,083	$775,301	$802,436
Mellon principal	3.50%	$-	$-	$-	$600,000	$621,000	$642,735	$665,231
Other donors principal	3.50%	$-	$-	$-	$600,000	$621,000	$642,735	$665,231
Total endowment		*$675,630*	*$675,630*	*$699,277*	*$1,923,752*	*$1,991,083*	*$2,060,771*	*$2,132,898*
Endowment return estimate - All sources (act. FY14-15)	4.50%	**$35,917**	**$35,917**	**$31,467**	**$86,569**	**$89,599**	**$92,735**	**$95,980**
Tuition per year est. +4%/year (act. FY14-16)	$6,200	$6,200	$6,324	$6,580	$6,843	$7,117	$7,402	$7,698
Fees per semester est. +2%/year (act. FY14-16)	$828	$828	$978	$1,067	$1,088	$1,110	$1,132	$1,154
Stipend per year est. +2%/year (act. FY14-16)	$21,580	$21,580	$21,580	$22,030	$22,471	$22,920	$23,378	$23,846
Annual student fellowship (tuition, fees, stipend)		**$28,608**	**$28,882**	**$29,677**	**$30,402**	**$31,147**	**$31,912**	**$32,698**
Number of students that can be funded/year		1.26	1.24	1.06	2.85	2.88	2.91	2.94

Actual figures in green

Physical Resources

The physical facilities to support the program are available in Smith Warehouse. It has been fundamental from the outset of the Visual Studies Initiative to create environments in which scholars with diverse disciplinary backgrounds and training can interact with each other and with students, such as the creation of experimental teaching and research spaces (4) adjacent to faculty offices, with teleconferencing capabilities.

Starting in December 2008, the Visual Studies Initiative pioneered a new type of experimental facility where humanists, engineers and scientists, theorists and practitioners, including artists, are housed together to facilitate daily communication and collaboration. In August 2013, a new facility of approximately 7,500 square feet has been added as Duke University in-kind contributions to the three major Mellon Grants, awarded 2007, 2010 and 2013 respectively. Both Bay 11 and Bay 10 (15,000 sq.ft.) house five new student project spaces, new teaching facilities with 3D projection capabilities, faculty offices, and eight on-site, fully operating laboratories or research programs. These lab research units coordinate the teaching and research agenda of Media, Art and Culture. Throughout their residency at Duke, our doctoral students will be expected to rotate each semester in one of the eight research units (four out of eight), and collaborate on research projects during their time with them.

The AAH&VS, AMI, ISS, and Computational Media, Arts & Cultures Smith Warehouse Bays (9-12) are already a hub of interdisciplinary exchange and media arts spaces. Their outstanding facilities and immediate proximity to FHI Bays (4-6), the MFA in Experimental & Documentary Arts (Carpentry) and the Center for Documentary Studies will nurture the PhD cohort through a clear sense of community, available spaces intended for collaboration, and direct access to a wide range of new and traditional technologies.

Smith Bay 12

Smith Bay 12 includes a fully equipped, Mac-based multimedia-computing classroom. The room also includes overhead projection, an additional HD display screen, and a seminar table, making it an ideal space for courses in which critical analysis and seminar-style discussions are combined with hands-on practice sessions and tutorials. This room is also available after-hours to students enrolled in classes and programs housed in the Smith Warehouse 11-12 space. Bay 12 also houses a second tech-equipped seminar room, a laptop cart with 14 Mac Pro machines, also imaged with multimedia software (which can be added to depending on programmatic need), and a production lab/group workspace currently used by ISS students and CMAC-affiliates for project-based work that requires installer access and persistent equipment setups.

Smith Bay 11

Bay 11, the former home to the Visual Studies Initiative, is now the Computational Media, Arts & Cultures workspace as in-kind facilities contribution to the VSI as part of the first Mellon Grant awarded in 2007. Together with the recently retrofitted Bay 10, we have a total capacity of 15,000 sq.ft. shared space. In Bay 11 faculty and staff from ISS, Literature, Computer Science, the Visualization & Interactive Systems Group; Art, Art History & Visual Studies work in labs and shared production facilities. Bay 11 includes a Media Art Lab, a Physical Computing Lab headed by Nick Gessler, a Media Studio run by Bill Seaman and The Wired! Lab. It contains projection plus 15

workstations outfitted with a full suite of visualization software packages as well a number of special purpose devices. Bay 11 also includes the Arcade, a mini-LINK multi-screen wall designed to work as a test-run and development space for the larger public LINK facility.

Smith Bay 10

Bay 10 is the most recent of the CMAC spaces, retrofitted in 2013 as Duke in-kind contribution to the Mellon Grant awarded in 2013 and with envisioned financial support from both the MA CHV and Graduate Program CMAC to offset M&O. Its 7,500 sq.ft. is divided between the Dig@Lab of Virtual Archaeology of Maurizio Forte, the ISS lab run by Victoria Szabo, the S-1 Speculative Sensation Lab, run by Mark Hansen, the Duke Art, Law & Markets Initiative (DALMI), headed by Hans Van Miegroet and the Emergence Lab of John Supko and Bill Seaman. It has two fully equipped undergraduate/graduate project spaces and two fully equipped graduate project spaces. Bay 10 also has several student break-out spaces, multiple wall screens (82" 4K super HD) and a new, mid-size lecture and project room (40) with 3D projection capabilities.

Smith Bay 9

Smith Bay 9 is the home of the Department of Art, Art History & Visual Studies. CMAC Graduate students will be welcome to use the graduate student shared workroom in Bay 9, as well as the kitchen, meeting, and lounge facilities there.

DiVE

The Duke immersive Virtual Environment (DiVE) is headed by Regis Kopper (Pratt School of Engineering) in collaboration with our Visualization & Interactive Systems Group. The DiVE is a fully immersive and interactive 6-sided CAVE-like system, funded by a major research instrument grant from NSF in 2004. Located in Duke's Pratt School of Engineering, the DiVE is a 3m x 3m x 3m stereoscopic rear projected room with head and hand tracking and real time computer graphics. All six surfaces—the four walls, the ceiling and the floor—are used as screens onto which computer graphics are displayed. It is a fully immersive room; the individual (researcher, educator, student, etc.) literally walks into the virtual world, is surrounded by the display and can interact with virtual objects in the world. Stereo glasses provide depth perception, and a handheld "wand" controls navigation and input to into the world for manipulating virtual objects.   The DiVE is one of nine 6-sided CAVE-like system in the world. This unique resource is ideal for experiencing architecture, sculpture, and cultural spaces at full size, one-to-one scale. Through the use of the DiVE, students in Computational Media, Arts & Cultures will gain a deeper understanding of modeling real-world objects. Issues such as lighting, scale, mass, and space are readily apparent when one is *inside* a building as compared to the "God's Eye" view typically given on a desktop system. We also plan to export 3D realizations to our student teaching and project space in Bay 10, which is equipped with wall-to-wall screens and advanced 3D projection capability.

The LINK

The Link in Perkins Library is an expansive and flexible campus facility offering innovative spatial and technological approaches to teaching and learning.   The leading edge teaching facility provides 6 large classrooms, 2 seminar rooms, and a number of smaller breakout spaces for students to work. The facility allows for video-conferencing, session recording, teaching with multiple monitors, and other innovative pedagogical techniques. It also contains a PC class-room with specialized software for CAD design and computer programming. This software base can be adapted according to faculty

needs through an imaging process managed by the Link team. Additionally, the Link offers a tablet PC laptop cart and a Mac laptop cart for individual student use. These images also can be adapted according to faculty needs.

The Link MediaWall (https://wiki.duke.edu/display/LMW/LMW+Home)

The Link MediaWalls are highly-visible and very capable exhibition venues, located in the lower level of Perkins Library, available for use by the Duke community. They include a 18-panel tiled wall display and a traditional-media wall. Both facilities are equipped with a series of directional speakers and network cameras, and are driven by a multi-core graphics server. The tile array can output a total potential field of 18.8 megapixels, allowing for the real-time display of high-resolution imagery. The Media Wall is programmed and maintained by our Visualization & Interactive Systems Team (VIS), based in Bay 11, and coded by our resident programmer and licensed architect (MArch), Todd Berreth (see http://toddberreth.com). This resource will provide the CMAC MA and PhD students a public mechanism for displaying work that takes advantage of this type of interface. An experimental version of the media wall is also available in Bay 11.

The /Edge: The Ruppert Commons for Research, Technology, and Collaboration

"The Edge extends Duke University Libraries' mission by providing a collaborative space for *interdisciplinary, data-driven, digitally reliant* or *team-based research*. Located on the renovated first floor of Bostock Library, the Edge brings together resources and expertise to help Duke researchers innovate, in a space that invites discovery, experimenting, and collaboration." https://library.duke.edu/edge

 This area houses the Digital Scholarship Services Lab, which focuses on digital project management and text analysis, and the Data and Visualization Services Center, which focuses on GIS and data visualization. Both units have already been working closely with the Visual Studies Initiative, Bass Connections, the Franklin Humanities Institute, and the Digital Humanities community on campus. Their consultants have worked with our graduate students on projects and taught guest workshops for graduate level courses.

RENCI Engagement Center

The Duke RENCI Engagement Center provides another potential site for collaboration and digital media expression. The multi-touch screen wall is being used to test out new interfaces for navigation in maps, 3D models, and virtual world spaces. RENCI supported some of the early work done by the Wired Lab and the DALMI lab in the areas of data management and visualization.

The Visual Media Center (VMC)

The VMC https://library.duke.edu/edge comprises the continuously expanding digital image collection, a scanning lab with film and flatbed scanners, a printing lab with a 12-ink plotter printer, a large exhibition space, and offices and work space for staff. The VMC is staffed by a director and an imaging specialist/web manager. Visual Media Collections @ Duke (https://imagine.aas.duke.edu) is the online image database for the Visual Media Center's digital collections. It is built on the MDID platform (Madison Digital Image Database software). The MDID online database is accessible to the university community. Through the University Libraries, Duke also subscribes to ARTstor, an online image database now containing over one million images (www.artstor.org).

C. ADDITIONAL RESOURCES NEEDED

We have the resources we need to launch the program. In fact, we already have six students in the Visual and Media Studies track of the Art, Art History & Visual Studies who self-identify as "Media Arts + Sciences" students (the former name of CMAC), and who have been waiting for us to formalize their status in the new program. These students have been supported through transitional and expendable funds that are now coming to an end. We need the formal program in place in order to release the endowment funds and admit new students, and to sustain the momentum we have been building.

D. POTENTIAL OR ACTUAL OUTSIDE FUNDING

As noted above, beyond the existing endowments, we anticipate some funding support for the program through tuition revenues from the Computational Media track of the AAHVS MA, which was approved by ECGF in December. We are publicizing this new track at the College Art Association, the ACM SIGGRAPH Conference, and at specialist meetings. We are also leveraging the HASTAC digital network and other social media fora to spread the word about the program. As the MA program gains traction we see it a valuable stepping stone for undergraduates (including our own at Duke) interested in developing computational media "chops" before applying to the PhD programs, as well as for positions in cultural heritage, marketing, and digital media consulting. Of the three students who graduated with the Historical and Cultural Visualization MA in December, one has been admitted to a PhD program in digital media and education, one has gone on to an academic technology consultant role at a selective liberal arts college, and one is exploring opportunities in scholarly publishing. Now that we have opened up the program to a wider range of potential student trajectories, and have begun to enrich our relationship to the data initiatives in SSRI and the Information Initiative, we anticipate more students to follow. We have already seen an uptick of potential interest from applicants from China in the MA, and see international students as a potentially rich source of qualified applicants for both the MA and the PhD programs going forward.

The CMAC leaders are actively working on strategies for fundraising, which includes conversations with Development around Digital Humanities funding opportunities, which may ultimately include direct support for this program. Jenson, Szabo, and Bell have already begun the conversation around soliciting donor support for graduate fellowships and are developing "fact sheets" to make the program and its objectives legible to this audience.

Individual Faculty research projects in the Labs may also provide support opportunities for graduate students and related activities via project based grants from NEH, NSF, and others. We are also working with the Franklin Humanities Institute to develop new grant proposals to Office of the Digital Humanities at NEH around specific digital projects already underway or in development by core faculty members. The group has a strong track record with NEH, as well as with the Getty, Kress and other foundation sources. In addition, several CMAC core faculty are already involved in a substantial NSF grant tied to retooling the Duke DIVE, which involves active use of virtual reality for historical and cultural, as well as artistic projects. In addition, the CMAC faculty have received a number of internal grants from Bass Connections, Humanities Writ Large, the Duke Digital Initiative, and other sources, which provide some support for graduate student teaching and research.

E. FINANCIAL AID, SCHOLARSHIPS AND FELLOWSHIPS

As a PhD program, we expect to fund our graduate students through five years of support. During that time, we anticipate recouping some costs through teaching and research assistantships in Information Science + Studies, Bass Connections, iiD, and other sources on campus. Our PhD students will also be competitive for Digital Humanities Initiative and PhD Lab summer research grants.

F. FIVE YEAR PROJECTIONS

We have put together a proposed teaching plan based on the historic teaching patterns of our core faculty. Included is an assumption that the core faculty from AAHVS and Literature will rotate through the Computational Media, Arts & Cultures Proseminar. We anticipate that faculty from other programs may wish to join our core and affiliated faculty member lists in the future as the program develops. We have enough faculty members here that we can accommodate leaves and still be able to comprise graduate committees in any given year. See below for **Descriptions of Courses and Learning Opportunities** for a proposed teaching rotation schedule.

Five Year Budget Projections attached

Alternating 1 and 0 admits per year, Mellon NCE, combined technical/research positions

2/1/16

	Notes	Base year 1	Year 1			Year 2			Year 3			Year 4			Year 5		
			16-17			17-18			18-19			19-20			20-21		
PhD MA+S			Fall 16	Spring 17	Total	Fall 17	Spring 18	Total	Fall 18	Spring 19	Total	Fall 19	Spring 20	Total	Fall 19	Spring 20	Total
1st year students (admit. Fall 2016)	Alt. 1-0-1-0 admits		1.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	1.0
2nd year students (admit. Fall 2015)			0.0	0.0	0.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	1.0	0.0	2.0	1.0
3rd year students (admit. Fall 2014)			2.0	2.0	2.0	0.0	0.0	0.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	1.0
4th year students (admit. Fall 2013)			1.0	1.0	1.0	2.0	2.0	2.0	0.0	0.0	0.0	1.0	1.0	1.0	0.0	0.0	0.0
5th year students (admit. Fall 2012)			2.0	2.0	2.0	1.0	1.0	1.0	2.0	2.0	2.0	0.0	0.0	0.0	1.0	1.0	1.0
Total students			6.0	6.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	2.0	2.0	2.0	3.0	5.0	4.0
EXPENSES																	
Student fellowships																	
Tuition per semester est. +4%/year		6,580	41,059	41,059	82,118	28,468	28,468	56,935	29,606	29,606	59,213	15,395	15,395	30,791	24,017	24,017	48,033
Fees per semester est. +2%/year	$40 extra 1st sem.	533	3,303	3,263	6,567	2,259	2,219	4,478	2,264	2,264	4,527	1,194	1,154	2,349	1,766	2,944	4,710
Stipend per year est. +2%/year		22,900	62,899	78,623	141,522	42,771	53,464	96,235	43,627	54,533	98,160	22,250	27,812	50,061	34,042	70,920	104,962
Student fellowships subtotal		37,127	107,261	122,946	230,207	73,498	84,151	157,649	75,496	86,403	161,900	38,839	44,362	83,201	59,825	97,881	157,706
Personnel																	
Administrative Coordinator (0.25 FTE) / TBD	3% est. annual raise	40,000	5,000	5,000	10,000	5,150	5,150	10,300	5,305	5,305	10,609	5,464	5,464	10,927	5,628	5,628	11,255
fringe benefits 25.6% / 26.3% / 26.9%			1,280	1,280	2,560	1,360	1,385	2,745	1,400	1,427	2,801	1,442	1,470	2,912	1,486	1,514	2,971
IT specialist (1.0 FTE) / TBD	3% est. annual raise	50,000	25,000	25,000	50,000	25,750	25,750	51,500	26,523	26,523	53,045	27,318	27,318	54,636	28,138	28,138	56,275
fringe benefits 25.6% / 26.3% / 26.9%			6,400	6,400	12,800	6,592	6,592	13,184	6,790	6,790	13,580	6,993	6,993	13,987	7,203	7,203	14,407
Personnel subtotal			37,680	37,680	75,360	38,852	38,877	77,729	40,017	40,044	80,034	41,218	41,245	82,463	42,454	42,482	84,908
Other Program Costs																	
Student projects (Mellon)	$16k/year	16,000	8,000	8,000	16,000	8,000	8,000	16,000	8,000	8,000	16,000	8,000	8,000	16,000	8,000	8,000	16,000
Faculty mini-grants (Mellon)		6,000	3,000	3,000	6,000	3,000	3,000	6,000	-	-	-	-	-	-	-	-	-
Misc. (Mellon, other)	$440 from Mellon	440	220	220	440	220	220	440	-	-	-	-	-	-	-	-	-
Conference travel support	1-time/year/student	600	3,600	-	3,600	2,400	-	2,400	2,400	-	2,400	1,200	-	1,200	1,800	-	1,800
Other costs subtotal			14,820	11,220	26,040	13,620	11,220	24,840	10,400	8,000	18,400	9,200	8,000	17,200	9,800	8,000	17,800
Total non-fellowship expenses			52,500	48,900	101,400	52,472	50,097	102,569	50,417	48,044	98,434	50,418	49,245	99,663	52,254	50,482	102,708
TOTAL PhD EXPENSES					$ 331,607			$ 260,218			$ 260,334			$ 182,864			$ 260,414
REVENUE																	
Student fellowships																	
# of FTE's funded by Grad. School discretionary	3 students, walk down				2.0			1.0			0.0			0.0			
Amt. FTE's Graduate School discretionary					$ 76,736			$ 39,412			$ -			$ -			$ -
# of FTE's funded by A&S discretionary	Lenoir commitment, 5 y.				1.0			1.0			1.0			1.0			0.0
Amt. FTE's A&S discretionary					$ 38,368			$ 39,412			$ 40,475			$ 41,600			$ -
# of FTE's funded by A&S PhD fellowships					0.0			0.0			1.0			0.0			1.0
Amt. FTE's A&S PhD fellowships					$ -			$ -			$ 40,475			$ -			$ 39,426
# FTE's Mellon endowments	2-3-3 FTEs				3.0			2.0			2.0			1.0			3.0
Amt. FTE's Mellon endowments					$ 115,104			$ 78,824			$ 80,950			$ 41,600			$ 118,279
Fellowship income subtotal					$ 230,207			$ 157,649			$ 161,900			$ 83,201			$ 157,706
Other program revenue																	
Projects, incl. research asst, equip. etc.	Mellon through FY18	16,000	8,000	8,000	16,000	8,000	8,000	16,000									
Faculty mini-grants	Mellon through FY18	6,000	3,000	3,000	6,000	3,000	3,000	6,000									
Misc.	Mellon through FY18	440	220	220	440	220	220	440									
Mellon MA+S personnel w/ NCE	Mellon through FY18		37,680	37,680	75,360	38,852	38,877	77,729	40,017	40,044	80,034						
Contribution from MA revenue (programmatic)					$ -			$ 14,263			$ 18,879			$ 23,841			$ 26,253
Other revenue subtotal					$ 97,800			$ 114,432			$ 98,913			$ 23,841			$ 26,253
TOTAL PHD REVENUE					$ 328,007			$ 272,081			$ 260,813			$ 107,042			$ 183,959
Revenue-Expenses	Deficit in parentheses				$ (3,600)			$ 11,863			$ 479			$ (75,821)			$ (76,455)
Cumulative balance PhD					$ (3,600)			$ 8,263			$ 8,742			$ (67,080)			$ (143,535)
Cost to A&S (fellowships + personnel not covered by other sources)					$ -			$ -			$ 40,475			$ 82,463			$ 124,335
MA revenue towards PhD fellowships					$ -			$ 28,526			$ 151,030			$ 262,253			$ 288,787
Bottom line to A&S	Deficit in parentheses				$ -			$ 28,526			$ 110,555			$ 179,791			$ 164,452

VI. DEGREE REQUIREMENTS AND PHD PROGRAM STRUCTURE

Students admitted into the Computational Media, Arts & Cultures PhD will be required to take the Computational Media, Arts & Cultures Proseminar, demonstrate competency in coding and digital media production and or a natural language, participate in four Practicum experiences during their first two years of study, and develop Methodological and Research Fields for their exams, which will be structured around a portfolio format. Dissertations will combine written and practice-based components, as appropriate to the topic, and be presented to the public. Demonstration of skills in mentoring, collaboration, and communication will be expected as well.

A. COURSE REQUIREMENTS

The graduate program requires the following courses and Practicum experiences (excluding language courses), to be taken over the course of the first 2 years of the program. The program requires 15 courses, including Practicum Courses; 2 max undergraduate courses, on approval. At least one course but have an explicitly historical focus, and one a theoretical focus, on advisor approval.

Computational Media, Arts & Cultures Proseminar (first semester) [1]

Two Practice-Based courses, such as: [2]

- Computational Media (Olson, Szabo)
- Historical and Cultural Visualization Proseminars 1 or 2 (Szabo, Olson, Wharton)
- Generative Media Authorship (Seaman)
- Technology and Performance (deFrantz)
- Physical Computing (Gessler)
- Designing Data (Herron)
- Motion Graphics (Salvatella de Prada)
- Virtual Reality (Kopper)
- Intro to Statistics, CS, or other related topics
- Other courses (including analog/studio-based) on approval of advisor
- Independent Study in a field not covered by a regular course

Four CMAC Faculty Led Seminars; [4]

Four Practicum Experiences [1-4]

Additional Electives, on approval [4+]

The electives should hang together in an approach or concentration to be developed in collaboration with the advisors. Sub-areas might include, for example, Textual/Audio/Video Interpretation; Narrative; Historical Analysis; Media Archeology; Cultural Analytics.

These sub-areas should involve a progressive sequence of technical and historical/critical topics, though the progressions themselves may hinge more upon a series of interrelated competencies and

areas of knowledge relevant to the student's interests. How those sub-areas are designed will be highly individual, and based in part on the background of the student in question. Sequences will be need to be customized because "mastery" of a field of technique will be in the areas most relevant to the research question. Some examples follow, but each case will vary:

A student interested in Textual/Audio/Video interpretation might focus on developing basic skills in statistics, and in working with data-driven tools. The computational language chosen might be R, with some additional coursework in statistics and in web design with javascript for presentation purposes. Depending upon their initial training, the student might learn beginning techniques through an undergraduate course in ISS and follow up in workshops, self-study, or a class at SSRI.

A student interested in Narrative might focus on techniques for anatomizing and representing a large series of texts, and in creating a custom annotation system for tagging motifs. He or she might spend their energies in learning database design and the principles creating XML files with Text Encoding Initiative (TEI)'s markup in order to create machine-readable texts that are interoperable with other text collections around the world. The student would need to learn XML and XLST to develop their own archive. Such a student would benefit from a Practicum Experience in the Library working with digital text collections.

A student interested in Historical Analysis might wish to do reconstructions of lost architecture, or of sites never built, and then create virtual reality experiences of those reconstructions for education and critique. He or she might take courses in 3D modeling, and develop programming skills in C-Sharp through coursework and workshops in the DIVE and online in order to created layered annotations of constructed objects in a virtual reality presentation. Such a student could follow the Intro to Unity course with Intro to Virtual Reality to learn how to apply such work.

A student interested in Media Archeology might become interested in questions of preservation and access to original digital platforms or forgotten technologies and focus on the creation of simulators, virtual machines, and experimental recreations. He or she might take courses or engage in self-study in physical computing that introduce C++, or learn some Assembly language, or even BASIC in order to understand that which they study. That student might also benefit from background in Java for web-based presentation of results.

A student interested in Cultural Analytics might want to emphasize realtime and retrospective data analysis of a variety of data feeds. He or she might choose to focus their computational media skills development in web design, CSS, javascript, JSON, and PHP/MySQL development. In addition to taking ISS course in web development, the student might benefit from taking the CS Introduction to Database Systems course, which would involve taking CS 101 plus an additional course as electives first.

In addition, students must complete the Graduate School Training on Academic Integrity and Responsible Conduct of Research.

B. LANGUAGE REQUIREMENTS

The minimum requirement for all students enrolled in the Ph.D. program is at least two languages other than English.

The human language requirements will be similar to those in other graduate programs in the humanities. The impact of computation on culture is a global phenomenon, with sites of innovation and impact everywhere. Students might study media theory, history or criticism in an original language, for example, or use language skills to delve deeper into a thesis project focused on non-Anglophone subject matter, or to do research based upon, or communicate with, collaborators from around the world.

At least one language must be a machine language. Students may demonstrate facility upon entry in the program, or sometime before their Preliminary Exams. Programming languages (e.g. executable code such as Python, C++, Java, PHP, Perl, assembly) are acceptable options, and in some cases, markup languages, scripting, etc. may qualify as well. Each student will be expected to consult with the DGS upon entry, and to identify a Machine Language advisor who will help guide development and administer the test.

Language abilities will be tested by departmental language exams. For traditional languages, these exams shall consist of two parts: 1) the translation of a passage with the use of a dictionary; and 2) the translation of a passage without the use of a dictionary. The student will be expected to demonstrate a sound grasp of the language as well as a familiarity with specialized terminology in that language relevant to their research.

For machine languages, the exams may consist of 1) a 2-hour media archaeological 'translation' and annotation of a piece of code—without access to documentation—that analyzes the code's logical and/or symbolic flow, the operations of its functions, and accounts for its outputs and, if applicable, GUI; or, 2) a 2-day coding assignment where the student demonstrates proficiency in a specified coding paradigm (machine, procedural, object-oriented) by producing an annotated, executable, proof-of-concept prototype that meets or exceeds a defined set of functional requirements. In all cases, the student will be expected to demonstrate a sound grasp of the language's programming paradigm as well as sufficient familiarity with the code's syntax to ensure his/her ability to carry out independent, high level work in that language.

As noted in the earlier examples, the specifics of the Computational Language Requirement will vary based on the interests and proficiencies of the students involved. Many of the Practice Courses example courses noted above. Some computational course requirements will be fulfilled in part through participation in foundational undergraduate courses in Computer Science, Statistics, etc., while others maybe fulfilled through foundational courses in Information Science + Studies. In most cases we anticipate some of the requirement will be met through individual follow-on self-study guided by a faculty or staff mentor, either through independent study or participation in a Practicum Experience application of the computational language, or both.

The PhD Lab and the ISS Certificate will be two hubs around which we invite participants into study groups. We have successfully organized these in the past for beginning iOS programming (in the FHI GreaterThanGames Lab) and in Unity3D (in the Wired lab). The PhD Lab currently hosts a study group of grad fellows who are learning how to work with sensor data analysis; they are bringing in an external speaker for follow-on workshops as well. The Library also does guest workshops in data visualization for the AAHVS MA . and we encourage students now to

follow up with the consultants there as their test projects evolve into more involved research. ISS is hosting an Intro to Unity Programming course this Fall that will use 3D models generated by other courses and projecs as the test-case examples for developing scenarios and interactions. We also anticipate developing summer bootcamp experiences in partnership with SSRI and the Libraries around data analysis basics in future years.

Longer term, within the context of Bass Information, Society, and Culture and Information Science + Studies we are already exploring the idea of Focus Clusters and Humanities Data+ projects that could involve graduate student TAs and RAs from this and other programs. Developing these areas is part of the work of Astrid Guigni, who is joining Duke in Fall 2016 in a position that bridges the English Department, the Information Initiative, and ISS. These courses could be valuable opportunities for our students to develop both mentoring and technical skills as they push their own competencies in supporting the undergraduates.

We also welcome additional core and affiliate faculty members who are interested in working with the graduate students in CMAC in the coming years.

C. TYPICAL PROGRAM OF STUDY

Year 1 Fall

- Computational Media, Arts & Cultures Proseminar
- Core Seminar 1
- Practice Course 1

Year 1 Spring

- Core Seminar 2
- Elective 1
- Practicum Experience 1

Language Exam 1

Year 2 Fall

- Core Seminar 3
- Practice Course 2
- Practicum Experience or Additional Elective

Year 2 Spring

- Core Seminar 4
- Elective 3
- Practicum Experience or Additional Elective

Language Exam 2

Year 3 Fall

- Elective 4
- Independent Study
- Practicum Experience or Additional Elective

Year 3 Spring

- Preliminary Exams
- Prospectus Defense

Year 4 Fall-Spring

- Dissertation Research

Year 5 Fall-Spring

- Dissertation writing and project

D. EXAMINATIONS

Students will be expected to take Qualifying Exams at the end of their third year of study. Exams will include Methodological and Research Fields, and will be structured around a portfolio format. While we expect exam topics to be highly individualized, we will expect graduate students to demonstrate a sophisticated theoretical understanding of Computational Media, Arts and Culture as explored by leading media theorists and critics, as well as deep engagement with computational media practices in their chosen subject areas.

E. CERTIFICATE

Students from AAH&VS, Literature, and other programs will have the option to complete a Certificate in Computational Media, Arts & Cultures, which will be so noted on their Ph.D. credentials. This Certificate will replace the current Information Science + Studies Graduate Certificate, which has similar requirements. The Certificate would require a total of six courses:

- Computational Media, Arts & Cultures Proseminar (replaces the Critical Studies in New Media required course in the current ISS Graduate Certificate)
- two core seminars from the approved Computational Media, Arts & Cultures list
- one Computational Media, Arts & Cultures Practicum
- two additional approved electives.

In addition, all students involved in the program will be expected to present a substantive computational media project in the Computational Media, Arts & Cultures Research Colloquium.

This Certificate, together with the activities of the Franklin Humanities Institute around Digital Humanities and the various Bass Connections Themes will help create a broader graduate student community around Computational Media, Arts & Cultures on campus and beyond.

VII. COURSES AND LEARNING OPPORTUNTIES

A. COMPUTATIONAL MEDIA, ARTS & CULTURES PROSEMINAR

The Proseminar is a team-taught course that will serve as an introductory overview of scholarship at the nexus of theory and practice. In its initial offering, the course will be taught by two core faculty (one from the theory side; one with a focus on practice) and is a requirement for all incoming CMAC students. Subsequently, the course will be taught by teams of core faculty on a rotating basis. The course may include visiting lectures by other core and affiliated faculty, on an ad hoc basis. (Upon review after two years, the steering committee will evaluate how the "team" approach has worked, and will consider other options,including a single instructor course with a suite of visiting lecturers drawn from the program's faculty.)

The Proseminar will include theoretical readings in computational media theory, design, and critique, and will focus on how these readings inform and provide critical context for practice-based modes of learning and production. The Proseminar will cover various areas of computational media theory and culture, including media archaeology, data and visualization, computation and culture, database and narrative, and data-mining and big data. The aim in each case will be to explore how theoretical approaches to media can both guide and challenge practical work in media design.

The Proseminar will include an orientation to the range of opportunities available in the Media Labs and other computationally-based projects around campus. In this modality, the Proseminar will serve as an introductory overview of the various Media Labs in which CMAC students may carry out work in fulfillment of the practicum requirement (see below). The Proseminar will be open to all Duke graduate students on a space-available basis. In addition to students from the MA in Computational Media as well as certificate students in CMAC, we anticipate participation from students in the MFA in Experimental and Documentary Arts and AMI and from the growing cohort of students across the Humanities with interests in media.

B. THE PRACTICUM EXPERIENCE

One of the key distinctions of this program lies in the Practicum experiences that it provides and in the substantial computational, socially engaged, and media practice-based dimensions it adds to theoretical and critical coursework that it offers. The programmatic mission of Computational Media, Arts & Cultures is to combine interdisciplinary theory and practice through new forms of scholarly research and production, culminating in a transdisciplinary dissertation project. Each Practicum Experience should yield a tangible product. The goals of the practica experiences are as follows:

- To gain exposure to the various ways in which computational media, arts and culture intersect apply to existing faculty research within the program and across campus
- To apply and deepen computational media technical skills learned through courses, workshops, tutorials, and self-study to a specific existing or emerging project
- To develop project management, mentoring, and collaboration skills by participating in an group project
- To formulate and sharpen individual questions and paths of inquiry within a larger interdisciplinary framework

These experiences will be customized to the individual student, and might emphasize more research, more hands-on production, outreach etc. based on student interests and project needs. Some students may participate in only one practicum experience, while others might participate in several (four or more). Beyond the specific skills gained through participation on lab projects, we anticipate these experiences will provide another meaningful way for CMAC students to develop relationships with graduate students with shared interests in other programs.

We anticipate most Practicum Experiences will involve either active engagement in an interdisciplinary Lab, or an ongoing research projects in Bass Connections, FHI, etc. A Practicum Experience might also involve partnership with an external entity such as a local history group, a tech startup, a museum, or a social justice organization. The dissertation project may well follow upon one or more of these experiences.

Some of the existing Labs in Smith are listed below, with the computational media tools and methods they use noted:

Complex Systems Lab	Physical Computing, Algorithmic Art and Programming
Duke Art, Law and Markets (DALMI) Lab	Database Design, Visual and Quantitative Data Analysis
Digital Archeology (Dig@Lab)	3D Modeling, Virtual Reality, Interactive Exhibitions
Emergence Lab	Generative Art and Music, Interface Design, Haptics, Installation Art; Digital Architecture
ISS Lab	Web Design, Mobile Applications, Augmented Reality, Virtual Worlds; 3D Printing
S-1 Lab	Biosensors, Physical Computing, Speculative Interaction Design
Visualization and Interactive Systems Lab	Data Mining, Network Analysis, Game Development
Wired! Lab for Digital Art History and Visual Culture	3D modeling, Photogrammetry, Digital Mapping, Museum Exhibitions
Digital Humanities (FHI and Libraries)	Digital Publishing, Digital Archives, Text Analysis, Historical GIS, Social Media, Data Visualization

Our mutual understanding of digital media affordances will only expand as we develop advanced research within and across our fields of inquiry.

Practicum Experiences will include participation in regular Lab or Project meetings, active work on an ongoing project, and a tangible product at the end of the semester. The Lab or Project Director and affiliated personnel will supervise them. These experiences should be viewed as a mentored, project-based learning opportunity for the graduate students, where computational media approaches to historical, theoretical and/or artistic questions are explored through active engagement in digital production and research. They also provide opportunities for graduate students in the program to meet and work closely with other graduate students involved in the Labs and other interdisciplinary projects.

Practicum Experiences and opportunities will be developed in consultation with Lab Directors, ISS, FHI, the Library, Bass Connections and the Visualization and Interactive Systems group members. The faculty leading the Labs or research projects would supervise them.

C. COMPUTATIONAL MEDIA, ARTS & CULTURES SEMINARS

The Core Seminars consist of graduate seminars taught by Core and Affiliated Faculty (on approval). A list of eligible courses will be updated regularly and posted to the C-MAC website. For the most part these courses are courses that are currently cross-listed in the existing Information Science + Studies Graduate Certificate offerings, and in Visual and Media Studies, though they may appear only in the listings of the faculty member's home department. Core faculty will commit to teaching at least one Computational Media, Arts & Cultures relevant graduate seminar every two years to ensure adequate opportunities. Students will also be encouraged to take historical and thematic courses relevant to their fields of study from all parts of campus, and will work closely with their advisors on customized trajectories suitable to a highly interdisciplinary program.

D. WORKSHOPS AND CO-CURRICULAR ACTIVITIES

Opportunities to develop skills related to computational media will occur both formally and informally CMAC-related courses and already often incorporate instructional modules and workshops on using commercially available software tools, drawing upon the expertise of staff who use these tools regularly in their own collaborative work

Workshops and instructional modules are already regularly offered to the wider community of students interested in computational media topics through the Smith Warehouse Visual Studies Labs, the Franklin Humanities Institute PhD Lab., the ISS Program, the Libraries, and other units on campus. .   For example, the Digital Art History/Computational Media Proseminar, which focuses on data-driven approaches to humanities research, brings in data visualization and GIS experts as consultants for course activities. Similarly, the Computational Media Studio class in the MFA in Experimental and Documentary Arts takes advantage of the Information Science+Studies Lab digital fabrication consultant's expertise, as well as offers students special access to the 3D printers, a laser cutter, projectors, cameras, physical computing devices, and specialized software used to create computational media projects.

CMAC students will be encouraged to take these workshops, and also to offers workshops of their own in areas of interest relevant to them. Students in Art, Art History & Visual Studies, Literature, the MFA in Experiential and Documentary Arts, and the MA in Digital Art History/Computational Media already have access to these opportunities, and participating in them will provide opportunities for mutual learning, exchange, and collaboration.

CMAC core faculty, along with leading staff research scientists, digital humanities consultants, and media producers in these organizations, already meet on a regular basis in order to develop curricular units and modules, plan experiences, and share knowledge. The Visualization and Interactive Systems Group focuses on the overlap between the sciences and engineering and the arts and humanities, while the Digital Humanities Klatch, sponsored by the FHI's Digital Humanities Initiative, coordinates special interest sub-groups around Text Analysis and Visualization, Digital Archives, 3D Modeling and Interactions, GIS and Mapping, and Project Management. Together these extra-departmental "units" offer a complementary, staff-based think tank and support network for computational media activities on campus in support of teaching and research. The goals of these groups are to coordinate resources, develop best practices, leverage existing knowledge to a wider community, and to further the field of computational media as it relates to historical, cultural, and scientific project development.

Some of the topicsof these workshops and modules include:

• *Data & Visualization*

> Data literacy (including data types and spreadsheet thinking), databases and data modeling, analysis methods (including basic machine learning), visualization (information design, effective visual communication), data-driven art;

• *Inputs*

> *Sensors, cameras (could include gigapixel, medical imaging and microscopy), Kinect and other body-sensing technologies like motion tracking, microphones, embedded sensors (including nano-tech and other probes) and wearable, textile and alternative interfaces. Ubiquitous computing;*

• *Deployable Construction Methods*

> *Prototyping (including modern manufacturing and rapid prototyping techniques such as 3D printing and laser cutting), design, and construction techniques;*

• *Physical Computing*

> *Arduino and Raspberry Pi. These both introduce the concepts not only of physical electronics, but they also are a nice entryway for programming, and they give a basis on which to build many types of sensors, measurements and input devices;*

• *Public Displays*

> *Projection mapping, tile walls, pico-projectors, rear projection. Ambient / peripheral displays;*

• *Virtual and Augmented Reality*

> *Many levels of technology from head-mounted displays to tablet computers to the Duke*
> *Immersive Visual Environment (DiVE) in collaboration with Pratt School of Engineering (see*
> *http://virtualreality.duke.edu);*

• *Simulation*

> *Complex systems and emergent phenomena within simple computational platforms. Nature*
> *and biology-based simulation;*

• *Narratives*

> *Linear and nonlinear storytelling. Public communication. Storytelling with data.*

As we develop the program we might look to Triangle partners through the mechanism of the Triangle Digital Humanities Network to develop summer training opportunities with UNC-Chapel Hill, NC State, NCCU and others in our region.

Beyond face-to-face learning experiences, many opportunities also exist for online learning of computer programming and the use of media applications. Students will be able to take available of resources in Lynda.com, the ACM Digital Library, and the Code Academy, for example. HASTAC has long been a pioneer in thinking about MOOCs, badging, and other techniques for expanding educational horizons. We will encourage students to form study groups around specific hardware and software applications, and can provide support through the ISS lab in Smith for exploration of specific technologies.

E. TEACHING AND RESEARCH OPPORTUNITIES FOR GRADUATE STUDENTS

Graduate Students in their second and third years might also earn TA/RA credit in the program by mentoring undergraduate students in Projects and Labs. As noted above, additional teaching and research opportunities offered through the Computational Media, Arts & Cultures (formerly ISS) undergraduate may become available to advanced graduate students over the summer and during the academic year. Program faculty will mentor graduate student instructors, and review progress in individually taught courses through mid-term class visits and reports.

F. SEMINARS AND ELECTIVES

The courses listed below reflect courses that already exist in the curriculum, and are being taught by our Core Faculty. Some might be revised slightly to include more project-based options for enrolled CMAC students.

Seminars

Professor Maurizio FORTE

- **Museums And Virtual Museums In The 3rd Millennium**

  This course is an introductory overview of the modern definition of museum in relation to the development of new digital narratives and applications for cultural heritage such as the

case of virtual museums. The transformation of museums in more dynamic, flexible and open institutions is a challenge of this century and, more importantly, this trend generates new job positions and different professional profiles at the level of cultural resource management, museum communication and technological research. The contemporary museums face actually new interdisciplinary challenges in between tradition/conservation and innovation, whereas different ways of communication are required by a very demanding variety of visitors. The digital applications are progressively transforming the museums in dynamic interactive spaces and models, whereas the information process is the core rather than their collections and artifacts. This situation raises new and very advanced forms of communication that have still to be investigated. The first part of the course addresses multidisciplinary questions on the theoretical overview of museums and their social impact in the 3rd millennium. The second part of the course will be focused on museums and digital technologies. More specifically, how digital technologies are transforming mission, physiognomy and communication of museums.

Professor Nicholas GESSLER

- *Physical Computing*. **QS, STS** Seminar in the algorithmic art & aesthetics of the "computational," rather than the "clockwork universe," "artificial life & culture" and both natural and technological "evolutionary computation." Emphasis on the medial physicality of both the underlying processes and the finished work. A critique of art inspired by the complexity of the natural world, art which dynamically instantiates those dynamics in works liberated from the conventional keyboard, mouse and display. Hands-on development of projects using "industrial strength" C/C++ for Windows, analog-to-digital converters and a variety of sensors and actuators in both a computer classroom and a lab workshop. No prerequisites. Instructor: Gessler. One course.

Professor Mark HANSEN

- *Space, Place, Movement, Media.* This course will explore the changing meaning and materiality of space and place in the context of the computational revolution. Focusing on media art and social media practices, we will explore various technological transformations of space (ubiquitous computing, locative media, RFID tagging, wireless networks, surveillance, etc.) in relation to now classic theorizations (Lefevbre, Soja, Harvey, Lynch, Jameson, etc.) and also to philosophical explorations of movement (from Aristotle, via Bergson, to the phenomenology of Husserl, Merleau-Ponty, and Jan Patocka). In our effort to theorize the transformation of spatial experience in our world today, we will attend to the correlation of space with place, as well as its historically momentous correlation with time.

- **Phenomenology and Media: ALP, CZ, CCI, STS, R:** Course will focus on phenomenology both as a philosophical movement and as a resource for contemporary media theory. Attention will center on the classical phase of phenomenology (from Husserl to Merleau-Ponty), on more recent developments in phenomenology and post-phenomenology (Levinas, Derrida, Fink, Barbaras), and on correlations between phenomenology and media theory (Ihde, Stiegler, Flusser). Key topics will include: reduction, experience, time-consciousness, sensation, world manifestation, differance, reversibility, de-presencing, worldliness, readiness-to-hand and thrownness. Instructor: Hansen. CL- Art History 630S, Information

> Science and Information Studies 630S, Visual and Media Studies 630S, Arts of the Moving Image 631S.

- ***Marxism and Media.*** In light of recent tactical alliances between corporate giants of the digital economy (Google and Facebook) and promoters of an open internet, it has never been more clear that media operate within the space of global capital and that their impact cannot be analyzed in isolation from the complex circuits that tie them to corporate interests. This course will focus on the relation between capital and media from Marx to today with the dual aim of exploring how media functions within capital and how it can provide possibilities for subjectivation that cut against capital's efforts to capture subjective time. We will explore contemporary forms of recording, data-mining and predictive analytics with an eye to how they create new forms of value and new experiences of alienation. Particular attention will be paid to post-Autonomist work by (mainly) Italian authors and its actual and potential interface with contemporary media practice and the digital economy.

Professor N. Katherine HAYLES

- ***Comparative Media Studies*****. STS, ALP***.*** Explores the impact of media forms on content, style, form, dissemination, & reception of literary & theoretical texts. Assumes media forms are materially instantiated & investigates their specificities as important factors in their cultural work. Puts different media forms into dialogue, including print, digital, sonic, kinematic & visual texts, & analyzes them within a theoretically informed comparative context. Focuses on twentieth & twenty-first century theories, literatures, & texts, esp. those participating in media upheavals subject to rapid transformations. Purview incl. transmedia narratives, where different versions of connected narratives appear in multiple media forms.

Professor Mark OLSON

- ***New Media, Memory, and the Visual Archive.*** ALP, STS Explores impact of new media on the nature of archives as technologies of cultural memory and knowledge production. Sustained engagement with major theorists of the archive through the optics of "media specificity" and the analytical resources of visual studies. Themes include: storage capacity of media; database as cultural form; body as archive; new media and the documentation of "everyday life"; memory, counter-memory, and the politics of the archive; archival materiality and digital ephemerality. Primary focus on visual artifacts (image, moving image) with consideration of the role of other sensory modalities in the construction of individual, institutional and collective memory. One course. C-L: Information Science and Information Studies 565S, Policy Journalism and Media

Professor Scott LINDROTH

- ***Maps and Flows: Sonification and Auditory Display.***
  Sonification entails representing multidimensional numerical data as sound. While visualization of numerical data has been an area of research in science and visual arts departments, sonification has been less widely used, even though sound and music are ideal vehicles for representing multidimensional (i.e., polyphonic) data that changes over time. We will explore practical musical strategies for mapping numerical data onto sound, as well as cultivate music that is enhanced by the poetic, expressive, anecdotal, and perhaps political nature of the data. Data sets include global climate measurements, Google n-grams,

Twitter feeds, and motion data captured by web cameras. This graduate course assumes familiarity with interactive music software tools such as MAX-MSP, SuperCollider, PD, or ChucK.

- ***Interactive Music*** This course focuses on the design of interactive motion-to-music systems, using web cameras and the Kinect camera with image processing to control the synthesis and performance of real time digital music. Course projects can include musical compositions as well as audio/media installations.   Students should be familiar with software tools such as MAX-MSP, SuperCollider, ChucK, or PD to do the class work.

Professor Bill SEAMAN

- ***Insight Engine.*** The Insight Engine is a tool to empower insight production, distributed interdisciplinary team-based research, and to potentially enable bisociational processes as discussed by Arthur Koestler in *The Act of Creation*. The initial goal of the project is to create an interactive system to enable intelligent juxtaposition of relevant texts and media elements via focused interaction, dynamic computational functionality, and intellectual "seeding" of the system. The work is an interactive learning system that facilitates a unique new form of online research. The class will extend current research (the project was funded by DIBS for year 1) through the potential design and creation of additional functionalities, to augment the system. The class will focus on individual and group-based projects including interface design, visualizations, simulations, code authorship (where appropriate), the exploration of virtual worlds, and/or specific datasets to later be nested at a deeper level in the system, or work in conjunction with the system. One focus of the class will be on the development of additional functionalities both in theory, and where possible, in practice (the development of new code). New forms of physical interface and human / computer interaction approaches will also be explored. Students will work in teams and/or on individual aspects of the project.

- ***The Body as Electrochemical Computer – Toward a New Computational and Aesthetic Paradigm.*** This course will present differing disciplinary perspectives working toward articulating new understandings of the body. These observations will in turn be used to elucidate a new computational and aesthetic paradigm. Discussions/lectures will be drawn from the Arts, Humanities, Biology, Cognitive Science, Psychology, Robotics, Physics, Ethics, Artificial Intelligence, Anthropology, and other research areas. The course will present and critique current models of the brain/mind/body/environment from multiple scientific perspectives. Concurrently students will develop aesthetic, scientific and/or conceptual art approaches to the content both alone and/or in groups. The class will also include invited lectures related to disciplinary / interdisciplinary / trans-disciplinary topic areas, and the generation of highly focused working groups. These groups will work toward articulating bridging languages to enable researchers to talk across disciplinary domains concerning particular research problems that are developed as part of the class. In particular, approaches to the development of a biologically inspired electrochemical computer will be discussed and explored. A multi-modal database will be created to share knowledge across disciplines [and document research generated in the class]. The database will form a repository for new forms of imaging, textual production and data collection and will also be discussed and employed as a research tool via meta-tags and relational combinatorics.

Students will be required to participate in ongoing discussion, as well as to develop particular aspects of research both individually and in groups. Each student will write a major research paper as a course requirement.

Professor John SUPKO

- *Generative Media Authorship* (current title; could change for future semesters) A graduate seminar designed & co-taught with Prof. Bill Seaman, Generative Media Authorship explores the implications of computer-based & systems theory-related processes on the creation of media, including (but not limited to) sound, image & text. Just a few of the topics to be discussed include: the parameterization of everything, the modularization of every-thing, substitution sets, data filtering, cybernetics, cellular automata, finite & infinite games, interface design, generative images & text, media ecologies.

- *Max/MSP Seminar*

  A seminar in which students learn the widely-used object-based audio & visual programming language Max/MSP. Students will learn to code in Max through a series of creative projects informed by their own interests & practices as artists. Max/MSP provides artists not only with the tools to create content but also a limitless array of possibilities for designing systems that deploy their content. Artists from a wide range of backgrounds use Max today: from visual & installation artists to sound artists & composers. Max/MSP has become a powerful expressive tool for any artist interested in the intersection of technology & art.

Professor Victoria SZABO

- *Digital Humanities: Theory and Practice*. ALP, STS Digital humanities theory and criticism. New modes of knowledge production in the digital era for humanists. Authoring and critiquing born digital projects as part of a theoretical, critical, and historical understanding of a special topic or theme in the humanities. Hands-on use of digital media hardware and software in combination with theoretical and critical readings for content analysis of text, images, audio, video and to create digital archives, databases, websites, environments, maps, and simulations. Independent digital projects + critical papers as final deliverables. Instructor: Szabo. One course. C-L: Visual and Media Studies 356S

  Digital Places and Spaces: Mirror, Hybrid, and Virtual Worlds. **ALP, SS, STS** History, theory, criticism, practice of creating digital places and spaces with maps, virtual worlds, and games. Links to "old," analog media. Virtual environment and world-building and historical narrative, museum, mapping, and architectural practices. Project-based seminar course w/ critical readings, historical and contemporary examples, world-building. Class exhibitions, critiques, and ongoing virtual showcase. Projects might include: web and multimedia, GPS and handheld data and media capture, 2D & 3D mapping, screen-based sims and game-engine based development, sensors and biometrics, and multimodal, haptic interfaces. Instructor: Szabo. One course. C-L: Visual and Media Studies 568S

- ***Mapping Culture: Geographies of Space, Mind, and Power***. **STS, ALP, CZ** History and practice of mapping as cultural practice and technique of world-building and historical and cultural representation. Emphasis on interplay of cartographic imagination, lived experience, historical and narrative power. Readings in mapping history, critical cartography, pyscho-geography, art maps, cognitive mapping, network maps, and spatial theory as well as contemporary approaches and critiques to maps, culture, politics. Exploration of map-based visualizations as narrative/argumentative devices. Hands-on work with geographical information systems, digital mapping tools, data viz, and digital storytelling systems. Theory/practice seminar culminating in a final research project.

Professor Hans J. VAN MIEGROET

- ***Art & Markets*** Analytical study of the emergence of art markets as well as interactions between market behavior(s) and visual/media production. Database research of large aggregates of sales data, price formation, including linear and hedonic regression analyses of preferences over time. Economic roots of market behavior and art auctions, auction technologies, including e-auction. In addition, the seminar also covers new techniques to measure art consumption, past and present. Horizontal exploration of cultural production and local art markets, and their emergence throughout Europe, Asia, and the Americas. Criteria for valuation of imagery or what makes art as a commodity desirable or fashionable and the role of art dealers as cross-cultural negotiants. Consent of instructor required. Instructor: Van Miegroet. C-L: ECON 321S; ARTHIST508S

Electives

- ***Fundamentals of Web-Based Multimedia Communications*** R, ALP, QS. Multimedia information systems, including presentation media, hypermedia, graphics, animation, sound, video, and integrated authoring techniques; underlying technologies that make them possible. Practice in the design innovation, programming, and assessment of web-based digital multimedia information systems. Intended for students in non-technical disciplines. Engineering or Computer Science students should take Engineering 206 or Computer Science 290. Instructor: Lucic Szabo

- ***Visual Cultures of Medicine.*** ALP, STS Exploration of the visual culture(s) of medicine. The changing role of diagnostic visuality and medical imaging from various philosophical and historical perspectives. The connections between medical ways of seeing and other modes of visuality, photography, cinema, television, computer graphics. The circulation of medical images and images of medicine in popular culture as well as in professional medical cultures. Instructor: Olson. One course. C-L: Information Science and Information Studies 279S

- ***Alternate Reality Games.*** ALP, STS Focus on Alternate Reality Games (ARGs) in theory and practice. ARG genre of interactive narrative. Real world as a game platform, often involving multiple media and game elements, to tell a story that may be affected by participants' ideas or actions. Direct interaction with characters in the game, plot-based challenges and puzzles, collaborative analysis of story and coordinated real-life and online activities. New media theory and history. Study of the most successful recent ARGs, exploration of alternate reality game design, collaborative construction of our own ARG. Individual and group projects, essays, and presentations. Lenoir. One course.

- ***Wired! New Representational Technologies***. ALP, CZ, STS Research and study in material culture and the visual arts expressed by using new visual technologies to record and communicate complex sets of visual and physical data from urban and/or archaeological sites. Introduces techniques for the presentation and interpretation of visual material through a series of interpretative and reconstructive technologies, including the development of web-pages (HTML/Dreamweaver), Photoshop, Illustrator, Google Sketch-up, Google Maps, and Flash. To develop techniques of interpretation and representation. Consent of instructor required. Instructor: Bruzelius and team. One course. C-L: ARTHIST 551LS / CMAC XXX

- ***Virtual Worlds***

  The course is intended to provide an introduction to the theory and practice of three-dimensional virtual environments (VEs). Through in-class discussions of related literature, students will develop a critical understanding of the complex design issues involved in the development of complex interaction techniques for advanced three-dimensional visualization systems. Such critical understanding will empower students to propose and develop effective virtual worlds. During a semester-long project, students will be encouraged to exercise creativity while following a user-centered design process. Instructor: Regis Kopper. One course.

- ***Technology and New Media: Academic Practice.*** STS, SS How information technology and new media transform knowledge production in academic practice through hands-on work. Critique of emergent digital culture as it impacts higher education; assessing impact of integrating such tools into scholarly work and pedagogical practice. Modular instruction with guest specialists assisting with information technology tools and media authorship theory. Topics may include: web development, information visualization, time-based media, databases, animations, virtual worlds and others. Theoretical readings; hands-on collaboration; ongoing application to individual student projects. Knowledge of basic web development, personal computer access recommended. Instructor: Szabo. One course.

- ***Data Transformations*** Creating mediated representations of data calls up many theoretical, practical, and ethical issues. This course approaches the representation and dissemination of data through a review and analysis of common processes of transformation. Data collection itself is a process of transforming real-world phenomena to constructed systems of measurement, a process that calls into question our ways of knowing what we know. Digital transformations that "clean", "process", or "wrangle" data (e.g., discretization, interpolation, disambiguation) make data sets more suitable for the systems of analysis we have at our disposal, and those analyses have similarly mediated outputs (e.g., significance tests, visualizations, documentation). This course will use projects, discussions, and papers to help students develop facility in practical transformation processes, as well as the critical application and interpretation of those transformations. Instructor: Angela Zoss. One course. Offered once a year.

G. TEACHING ROTATION

This teaching rotation reflects a possible order for faculty to rotate through the required proseminar, and also demonstrates that we would be able offer seminars and practice-based courses as needed to support our students. Students would also be interweaving courses from around campus as their outside electives.

2017-18

Core:

- **Computational Media, Arts & Cultures Proseminar** (Seaman/Supko)

Seminars:

- CLST/ARH Museums and Virtual Museums in the 3rd Millennium (Forte, DiG Lab)
- ARH/VMS Arts and Markets (Van Miegroet, DALMI Lab)

Practice:

- Computational Media (Olson)
- Digital Humanities Theory and Practice (Szabo)

2018-19

Core:

- **Computational Media, Arts & Cultures Proseminar** (Hayles/Szabo)

Seminars (Lab Connections):

- ISS/VMS: Mapping Culture: Geographies of Space, Mind and Power (Szabo, Wired Lab)
- VMS: Generative Media (Seaman/Supko, Emergence Lab)

Practice:

- Virtual Museums (Forte)
- Humanities Data Analysis (Herron)

2019-20

Core:

Computational Media, Arts & Cultures Proseminar (Van Miegroet/Dauberchies)

- Seminars
- VMS/CLST: Digital Archeology (Forte)
- LIT: Comparative Media Studies (Hayles, FHI)

Practice:

- Virtual Reality (Kopper)
- Maps and Flows: Sonification and Auditory Displays (Lindroth)

2020-21

Core:

- **Computational Media, Arts & Cultures Proseminar** (Lindoth/Olson)

Seminars:

- LIT/VMS Phenomenology and Media (Hansen, S-1 Lab)
- Experimental Communities (Lasch, Art Studio)

Practice:

- Technology and Performance (DeFrantz)
- Physical Computing (Gessler)

2021-22

Core:

- **Computational Media, Arts & Cultures Proseminar** (Szabo/Lasch)

Seminars (Lab Connections):

- The Lives of Things (Bruzelius, Wired Lab)
- Comparative Media Studies (Hayles, FHI)

Practice:

- Emergent Interface Design (Seaman)
- Computational Media (Olson)

VIII. PROGRAM FACULTY

A. LEADERSHIP

The **Executive Committee** will consist of faculty representatives of the core constituting parties: Art, Art History and Visual Studies, Literature, Information Science + Studies, and the Franklin Humanities Institute. Proposed members are Hans van Miegroet, Mark Hansen, Victoria Szabo, and Deborah Jenson.

The **Admissions and Steering Committee** will consist of the Core Faculty Members. Affiliated Faculty Members will be invited to provide input as well.

B. CORE AND AFFILIATED FACULTY

Being a Core Faculty member in Computational Media, Arts & Cultures means being willing to direct theses, co-teach the introductory seminar, and offer Lab or computational practice-based Practicum experiences to graduate students. Core Faculty also serve on the Steering Committee of the group. Typically Core faculty already teach graduate seminars suitable to the program (see below under Sample Courses). These courses will also be cross-listed in Information Science + Studies as appropriate.

Being an Affiliated Faculty member means being willing to serve on graduate committees, as well as teaching courses potentially relevant to the program. The CMAC group welcomes a wide range of additional Faculty Affiliates from across campus and beyond.

This initial list of Core and Affiliated Faculty builds upon the experience of a group of faculty that has already worked effectively together, but it is not meant to be exclusive. We have discussed potential collaboration with SSRI on courses and summer workshops around data-related topics, for example, and can see productive links developing with the Language, Arts, and Media Program and the Franklin Humanities Institute around new forms of authorship as well. We will encourage individuals wishing to become Core Faculty to apply to the Executive Committee and demonstrate support of their home Departments for their participation. Affiliated faculty might come from new or existing research partnerships such as Bass Connections, Humanities Writ Large, or external teaching or research partnerships, such as those we already enjoy with Jacobs University in Bremen, Germany and Venice International University in Italy.

Both types of faculty might also teach independent study courses around special topic areas relevant to individual students' work. These courses would be listed either in Information Science + Studies or the home department of the faculty member in question, depending on upon the subject matter.

Core Graduate Faculty:

- Ingrid Dauberchies (Math)
- Maurizio Forte (Classical Studies and AAH&VS)
- Mark Hansen (Literature and AAH&VS)
- Katherine Hayles (Literature and English)
- Pedro Lasch (AAH&VS)
- Scott Lindroth (Music)

- Mark Olson (AAH&VS; after 2018)
- Bill Seaman (AAH&VS)
- Kristine Stiles (AAH&VS)
- John Supko (Music)
- Victoria Szabo (AAH&VS, ISS and FHI DHI)
- Hans Van Miegroet (AAH&VS)

Affiliated Faculty:

- Robert Calderbank (ECE and iiD)
- Mine Cetinkaya-Rundel (Statistics)
- Thomas DeFrantz (African and African American Studies and Dance)
- Sheila Dillon (AAH&VS and Classical Studies)
- Sonke Johnson (Biology)
- Regis Kopper (Mechanical Engineering and Material Science; DiVE Director)
- Mauro Maggioni (Mathematics and CS; Electrical and Computer Engineering)
- Tuan Vo-Dihn (Biomedical Engineering; Photonics)
- Annabel Wharton (AAH&VS)

Affiliated Instructors and Staff: (collaborate on theory-practice course modules, Labs, and workshops; may also teach undergraduate courses that cover relevant material)

- Todd Berreth, Designer and Research Programmer, Art, Art History & Visual Studies
- Nick Gessler, Research Scholar, Information Science + Studies
- Patrick Herron, Senior Research Scientist, Information Science + Studies
- Hannah Jacobs, Digital Humanities Teaching and Research Consultant, Wired! Lab
- Angela Zoss, Senior Data Visualization Analyst, Duke Libraries
- Eric Monson, Data Visualization Analyst, Duke Libraries

Franklin Humanities Institute Partners

- Deborah Jenson, Professor of Romance Studies and Director, Franklin Humanities Institute
- David Bell, Professor of Romance Studies and Co-Director, PhD Lab in Digital Knowledge, Franklin Humanities Institute
- Christina Chia, Associate Director, Franklin Humanities Institute

C. FACULTY CVS

Faculty CVs are appended to the end of this document.

D. GRADUATE COMMITTEES

The graduate committee will typically be comprised of at least two faculty affiliated with the program, with the advisor being a Core Faculty member, in compliance with Graduate School regulations. Additional committee members may come from any part of the university, subject to Graduate School approval.

An additional category of External Advisors may come from museums, industry, the non-profit worlds or other spheres relevant to the students' portfolio and dissertation projects. These external advisors will normally not be formal voting members of exam or dissertation committees, but may offer input on the students' work in technical, social, or pragmatic terms. As we expect some of our students will develop projects that include public-facing dimensions, we expect these relationships to be important to research dissemination through exhibitions, app deployment, and digital publications.

E. IMPACT ON TEACHING AND ADVISING LOAD FOR FACULTY

We anticipate that the extra teaching burden will be minimal due to the relatively low number of students (3-5) in the initial set of 5-year periods. Faculty affiliated with the program would be expected to teach the Computational Media, Arts & Cultures seminar once every 3-4 years, and to each offer a seminar that would qualify as a core seminar every 2-3 years, though they might wish to teach such courses more frequently.

The primary faculty advisor would be selected by the student from the Computational Media, Arts & Cultures core faculty. As this is an interdepartmental, interdisciplinary program, additional committee members would come from AAH&VS, Literature, and other units on campus, as appropriate. Dissertations that include significant production or practice components in areas of knowledge where the terminal degree is not a PhD, may include one committee member with a terminal degree or equivalent production experience from his or her area. This is necessary to guarantee the highest level of competence and scholarly quality in these areas as far as each particular thesis project is concerned.

Most of the seminars taught in the program already exist in some form, and would be taught by the faculty as part of their normal course load in those departments. For example, Mark Hansen may teach a course on media theory with the listing department noted as Literature that would also be appropriate for Computational Media, Arts & Cultures students. Bill Seaman may teach a course on emergent computation as part of his regular load in AAH&VS that would interest students in Computational Media, Arts & Cultures. Katherine Hayles may offer a course in digital literature as part of her regular load in Literature that would interest Computational Media, Arts & Cultures students, and so on. Such courses would leverage teaching resources so that a full spectrum of graduate seminars would be offered each semester appropriate for Computational Media, Arts & Cultures students without initially requiring any new faculty hires, although there may be the possibility for future hires as the program grows and develops.

IX. RECRUITMENT PLAN

A. ADMISSIONS

We propose to set up an independent admissions committee composed of core faculty affiliated with Computational Media, Arts & Cultures. Each year, the core faculty will indicate their availability to accept new students through the Computational Media, Arts & Cultures program website. We already receive numerous applications though Art, Art History & Visual Studies and Literature for graduate students who might fit the program. We will encourage other Humanities Programs to

forward any potentially relevant students to us. Given Duke's stature internationally, we do not anticipate having difficulties attracting qualified students to the program.

B. ADVERTISING

We will advertise the program through direct mailings to Chairs in media studies and other relevant programs, post to online lists and social media, and place targeted advertisement in journals and at conferences such as MLA, College Art, American Studies, Society for Literature, Science and the Arts, SIGGRAPH, SIGGRAPH Asia, the International Communications Association, the American Historical Society, International Society of Electronic Arts (ISEA), HASTC, and the Conference on College Composition and Communication (4cs). Individual faculty will also advertise within their own research communities.

We will also develop a website that showcases the work already being done at Duke in the general area of Computational Media. All of the interdisicplinary Labs in Smith have web presences; we will coordinate these under one online umbrella for ease of access, building off the work we have begun for the Computational Media MA track. The FHI is also already putting together a Digital Humanities Initiative website that showcases DH projects that we can leverage for publicity.

C. DIVERSITY OF STUDY BODY AND FACULTY

Our approach to Computational Media, Arts & Cultures is intentionally inclusive. We see diversity and inclusiveness as of central importance in thinking through what computation means to media, arts, and culture. The Digital Humanities as an emergent field has struggled with concerns over who is "in" and who is "out," and whether work that focuses on social justice and cultural inequality rather than on novel computing techniques should count as scholarship in the field. We want to avoid those limits in how we conceptualize our activities. Because our interests are in the artistic and cultural potential and effects of computational media, as well as in the theories and affordances of computation, we welcome students who wish to pursue this type of work, alongside those whose interests have a more abstract and theoretical quality. This is in keeping with Duke's ongoing commitments to making a difference in the world and knowledge in the service to society. As we have discovered through the Information Science + Studies program's undergraduate curriculum, a wider range of students are drawn to contexts that allow them to explore computation through application design and development. Many of the projects already undertaken by our faculty reflect attention to, and awareness of, the social and cultural impact of, and potentials for computation. These commitments will be highlighted on our website and in our publicity materials alongside theoretical, aesthetic, and technical interests, and we will ensure that the individualized nature of the graduate program opportunities are made apparent.

The Digital Humanities Initiative theme, DH+, intentionally draws attention to the idea of global DH as a cornerstone of our work. In addition, our partnership with the John Hope Franklin Humanities Institute offers us unique opportunities to reach diverse communities with our outreach and programming. The DHI within the FHI is already working with Durham's NCCU, the nation's first public liberal arts college founded for African-Americans, on a faculty training workshop that will include participants from both institutions working with Durham history resources in order to develop digital pedagogy elements in a global studies program. FHI just approved funding for a project focused on Sound Studies in the Global South that involves a graduate student collaborator. We can easily imagine such a project involving one or more of our graduate students. Similarly, the

iiD Data+ initiative is developing a humanities component that will reflect a social dimension as well. As our curriculum description demonstrates, we are working actively to ensure that all students have the opportunity to fulfill the coding and media production requirements of the program through summer workshops, practicum training, and individualized study. We will highlight this in our recruiting.

We would like to create a unique, pro-active invitation or personalized, detailed information about the program that is sent to organizations representing prospective students from various backgrounds, and to organize several open house days throughout the academic year. We shall also solicit practical advice from Graduate Admissions on ways to enrich our applicant pool.

Because our program is inherently collaborative and interdisciplinary, we expect to see a great deal of intellectual diversity amongst our student as well. We need to be critically aware that diversity includes attracting students with diverse experience and training backgrounds (as mapped out in the graduate student profiles), as well those of different physical abilities, religion, race, ethnicity, and genders. In sum, we need to proactively develop a diverse student and faculty body in addition to paying attention to diversity in discipline(s), intellectual outlook, cognitive style, and personality types to offer students the breadth of ideas that constitute a dynamic intellectual community, which Computational Media, Arts & Cultures promises to be.

Once student are in the program, we anticipate advanced students mentoring incoming students through the Practicum Experiences as well, to help ensure their success.

Our current faculty list is a diverse team, but we can do more to enrich our community. As the program develops, we can image a variety of collaborations between our graduate students and faculty members around campus, much in the way that the MFA students have become involved in various documentary-oriented projects. We will encourage such exploration in our students, and have designed the program so that novel groupings of faculty and students are possible. As members of the PhD Lab students will also have the opportunity to develop colloquia, invite speakers, and form interest groups around broad themes related to culture and computation, a freedom that we hope will also foster diversity and inclusiveness.

X. CAREER DEVELOPMENT SERVICES

In collaboration with the MFA in Experimental and Documentary Arts and the MA in Historical and Cultural Visualization, we plan to set up a joint Career Advice and Job Placement Unit, following the advise of Wesley Hogan, Director Center for Documentary Studies at Duke. We are currently in contact with four programs that have experience with job placement for graduates in related programs, namely Massachusetts Institute of Technology (Media Arts and Sciences), New York University (Tisch School of the Arts), UC Santa Barbara (Media Arts & Technology) and the University of Texas at Dallas (Arts and Technology). To make the Career Advise Unit most effective, we need to integrate it into our operations in Bay 11-Bay 10, Smith Warehouse, in close proximity to the student project spaces, the faculty offices and the operating labs.

We obviously do not need to replicate what already exists at Duke, for career counseling is an ongoing service available to all Duke graduate students via Duke Student Affairs (http://studentaffairs.duke.edu/career/career-services). They are familiar with graduate students with "unique Duke backgrounds" and help them prepare future career goals or to prepare for another degree program. However, we are committed to establish our own Office of Career Services to help our students and alumni to identify jobs and internships.

But as mentioned above, we seek to set up a collaborative structure that serves several units, comparable to our business center, which is now fully operational. We are in the process developing a web-based system to make advising appointments, view job and internship listings, and find forms for Professional Development Funds and Internship Approval and download our handouts and presentations on professional skills and CMAC careers. We also plan to have a dedicated adviser in place in our jointly governed Office of Career Services and are committed to help our graduate students with general career planning, networking advice, and resume and cover letter review.

XI. STUDENT SUPPORT SERVICES

Because the program is so small, and is associated with two existing PhD programs, we anticipate students will be able to take advantage of the already-existing support services in AAHVS and Literature. As with our existing international PhD and MA students, we will work closely with the Visa office, the Writing Program, and other resources on campus as needed.

Because we anticipate that students in the program will come from a range of backgrounds, we will institute written mid-term evaluations with all faculty instructors in the program to identify areas needing attention. We anticipate some students may need additional help with technical skills development, and can direct them towards available staff for training. Duke has an unusually rich set of resources both in person and online (for example, Lynda.com) that can be beneficial in these areas. In addition, we have spoken with Computer Science about the feasibility of having graduate students enroll in undergraduate courses. They have indicated this is possible on a space-available basis.

In terms of community development, we expect that the Franklin Humanities Institute, as a site of Digital Humanities collaboration on campus, will become a home to these students, along with the CMAC Certificate students. We will actively ensure that these students are integrated into the AAHVS and Literature listervs and community gatherings as well.

Because we anticipate grads will work closely in Smith, FHI, and Bass Connections projects, we will work closely with those initiatives to develop and present opportunities to graduate students in the

program through the Digital Humanities Initiative and CMAC mailing lists, websites, and other communications structures.

XII. PROGRAM ASSESSMENT

Concerning assessment, we have set up a Computational Media, Arts & Cultures Assessment Committee, which has several faculty among its membership with extensive DUS and DGS experience. The charge of this committee is to map in a systematic manner learning outcomes as well as to pay attention to the experiences that lead to those outcomes. Here too, we shall seek advice from our Executive Committee and Board of Advisors. Information about outcomes is of high importance; where students "end up" matters greatly, so we need to pay attention to future placement scenarios. It is clear that to improve outcomes, we need to know about student experiences especially those gained from the pro-seminars and lab rotations, the curricula, teaching, and kind of student (and faculty) engagement that leads to particular outcomes. We envision to conduct at least one detailed interview per semester, complemented by an exit interview upon completion of the residence. We plan to use the same metrics semester after semester and systematically collect examples of student performance, conform to established Duke Arts & Sciences practices. The point is to monitor progress toward intended goals in a spirit of continuous improvement. Throughout this monitoring procedure, the assessment process itself should be evaluated and refined in light of emerging insights.

For the PhD, indirect assessment via some mechanism designed to assess what they are seeking from the program and administered at the outset (do they want to acquire theoretical skills and a theoretical research program, etc.?, do they want to bring a practical dimension to their scholarly work and endeavors, etc.?) and then again at the point of completion of the dissertation project (and possibly at the exam stage as well).

Direct measurement: evaluation of their performance in the required core course in media, in their qualifying exams and in their dissertation. This evaluation can be correlated with their aims as discovered through indirect evaluation.

Key metrics for program effectiveness will include:

- quality of student projects as determined by reviews from faculty on the humanities, engineering and sciences sides of the program;
- selection of current and graduate work for scholarly talks, exhibitions, grants, and publications;
- job placement and graduate admissions data (for MA students pursuing future work);
- student feedback about the program as determined through periodic focus groups, anonymized feedback, and exit interviews.

Though at this stage, both assessment and placement remain somewhat hypothetical, the main objective here is to improve the whole of the student's learning as well as to improve the teaching and research mission of the constituting programs and labs.

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If you would like to view the many letters of support and CVs for this proposal, please email Sandra Walton in the Academic Council office at sandra.walton@duke.edu and she will provide them to you.