



Center for Digital Arts and Experimental Media  
University of Washington

University Initiative Fund Program Self Study  
Submitted to the Graduate School Review Committee

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## Outline of Self-Study Guiding Questions

### Questions Regarding the Program in General

1. What are your unit's strengths? Units generally have a variety of roles and responsibilities within the institution (e.g., undergraduate, graduate, professional education; continuing education; outreach education; research, scholarly, or creative activity; service; consultation; self sustaining activities; patient care). Please describe what you do, focusing particularly on those things you do well. You may wish to include examples of long-term excellence as well as any recent accomplishments or improvements in your unit. In what ways is your unit a leader in your field?

DXARTS History  
DXARTS Research  
DXARTS Pedagogy  
DXARTS Infrastructure  
DXARTS Community  
DXARTS Successes  
Also integrated throughout the document

2. How do you measure the success of your unit as a whole? What teaching, research and service performance criteria are typical in your field? Which units nationally do you consider to be your peers along these dimensions?

DXARTS History  
DXARTS Research  
DXARTS Community  
DXARTS Successes

3. What are your unit's weaknesses? No unit is perfect. Where could yours most use improvement? What challenges or obstacles make it difficult for you to overcome these weaknesses? What further challenges do you foresee in the coming years?

DXARTS Assessment  
DXARTS Needs and Concerns  
DXARTS Strategic Initiatives

4. What changes have occurred in teaching, research and service in your field since the last review that have influenced your conception of the unit's role? What pressures, internal and external, have caused significant changes, and what further pressures and changes do you anticipate in the next ten years? What changes have taken place in the relationships between your field and other related fields? Some changes that may or may not be relevant to your unit include the rise of interdisciplinary studies, international study, experiential learning, and programs in civic education and leadership, as well as technological changes--the rise of online courses and new educational technology. Which (if any) of these have had an impact on your unit? For interdisciplinary programs, please comment on the level of cooperation and support to the program from contributing units.

DXARTS History  
DXARTS Pedagogy  
DXARTS Community  
DXARTS Assessment  
DXARTS Needs and Concerns  
DXARTS Strategic Initiative

5. Do you observe differences between your view of your role and college and university expectations of your unit? If so, what are these? Do you see any ways to resolve these differences?

DXARTS Community

6. Describe faculty participation in the process of unit governance, self-study, and strategic planning. How do your faculty participate in governance and strategic planning?

DXARTS Research

7. Is mentoring junior faculty identified as a priority? Outline your unit's approach to mentoring junior faculty, graduate students, undergraduate students. Note: The Graduate School offers a brochure "Guidelines for Good Practice in Graduate Education" and be obtained by contacting the Office of Academic Programs.

DXARTS Pedagogy

### Questions Regarding Teaching

1. For each faculty member in your department, please list: number of courses taught per year, number of credits taught, and total student credit hours. Numbers may be approximate and should illustrate a typical year.

DXARTS Pedagogy

2. How are teaching responsibilities allocated? For interdisciplinary programs: How are teaching loads negotiated and balanced between home departments and the interdisciplinary unit?

DXARTS Pedagogy

3. Other than classroom teaching, how are faculty involved in undergraduate student learning and development (for example, advising, mentoring, and supervising independent study)?

DXARTS Pedagogy

4. How do faculty involve undergraduate students in research and scholarship?

DXARTS Pedagogy

5. How does the department evaluate the instructional effectiveness of faculty?

DXARTS Pedagogy

6. Please summarize the data you collect, possibly using OEA or CIDR, to evaluate the impact of your teaching on student learning. You might want to focus on illustrative examples. Please describe selected specific changes you have made in response to the data you have collected.

DXARTS Pedagogy

DXARTS Assessment

7. What procedures, such as mentoring junior faculty, does the department use to help faculty improve undergraduate teaching and learning? What training and support is provided to TAs to help them be effective in their instructional role?

DXARTS Pedagogy

DXARTS Assessment

8. How does the unit track and promote innovations and best practices in undergraduate and graduate student learning?

DXARTS Pedagogy

DXARTS Successes

## DXARTS Assessment

### Questions Regarding Research and Productivity

1. How does your unit balance the pursuit of areas of scholarly interest by individual faculty with the goals and expectations of the department, school, college and University? How are decisions involving faculty promotion, salary and retention made? For interdisciplinary programs: How do you balance the demands of home departments and of the interdisciplinary unit?

DXARTS Infrastructure  
DXARTS Community

2. How are junior faculty members mentored in terms of research and creative productivity?

DXARTS Pedagogy

3. What has been the impact of your research on your field and more broadly over the past five years?

DXARTS Research  
DXARTS Successes

4. In what ways have advances in your discipline, changing paradigms, changing funding patterns, new technologies, or other changes influenced research, scholarship, or creative activity in your unit?

DXARTS History  
DXARTS Research  
DXARTS Pedagogy  
DXARTS Infrastructure  
DXARTS Community  
DXARTS Successes  
Also integrated throughout the document

5. Some units are more heterogeneous than others. What variations exist among your faculty in terms of methodologies, paradigms, or subfield specializations? Are faculty offices all in the same building, or are they geographically dispersed? What strengths and weaknesses for the unit as a whole are generated by differences among its faculty? Do any of these differences generate obstacles to communication? If so, what strategies has the unit developed to promote communication between different constituencies, and how successful have these strategies been?

DXARTS History  
DXARTS Research  
DXARTS Pedagogy  
DXARTS Infrastructure  
DXARTS Community  
Also integrated throughout the document

6. What impediments to faculty productivity exist, and do you see ways of reducing these?

DXARTS Concerns and Needs  
DXARTS Strategic Initiatives

7. What steps has your unit taken to encourage and preserve productivity on the part of all segments of your staff? How are staff recognized and rewarded? What programs are in place to support professional development of staff?

DXARTS Research

DXARTS Pedagogy  
DXARTS Infrastructure  
DXARTS Community  
Also integrated throughout the document

### Questions Regarding the Relationship with Other Units

1. In what ways do you collaborate with units at other institutions or at the University of Washington? What are the impacts of these collaborations? Do members of your unit engage in or have opportunities to engage in interdisciplinary research? Do ties to other units or other kinds of interdisciplinary opportunities aid you in recruiting new faculty and graduate students? In what ways, if any, do they improve your graduate and undergraduate education? Do you face impediments to developing interdisciplinary research or connections with other units? Expansion of interdisciplinary programs is an emerging issue. Describe you unit's relationships with other units and work with other units to plan future initiatives.

DXARTS History  
DXARTS Research  
DXARTS Pedagogy  
DXARTS Infrastructure  
DXARTS Community  
DXARTS Successes  
Also integrated throughout the document

2. How could the university aid you in strengthening such ties? For already existing interdisciplinary programs: How do you maintain relationships with contributing units? Are there other units that could enhance your interdisciplinary perspective? Do you face impediments in approaching these other units? How could the university aid you in solidifying old relationships and fostering new ones?

DXARTS Research  
DXARTS Community  
DXARTS Concerns and Needs  
DXARTS Strategic Initiatives

3. There is an expectation of faculty participation in the governance of the Department, the College or School, and the University. How do faculty members within your unit meet this expectation? How is participation in shared governance encouraged and valued?

DXARTS History  
DXARTS Research  
DXARTS Community

### Questions Regarding Diversity

1. Describe for your unit the inclusion of underrepresented groups for students (by entering cohort), faculty (by rank) and staff.

DXARTS Assessment

2. Please provide data comparing the teaching loads and other duties of any members of underrepresented groups in your unit to others of comparable professorial rank.

DXARTS Pedagogy

3. What steps, including outreach and recruitment, has your unit taken to ensure an environment that values diversity and supports all faculty, students and staff, including members of

underrepresented groups? Have you been able to retain students and faculty from these groups once you have recruited them? What factors aid or impede your efforts to recruit and retain members of underrepresented groups? Is there anything the University can do to help you with recruitment and retention? (*needs to be clearer*)

DXARTS Assessment

4. Does your unit work with the Graduate Opportunity Minority Achievement Program (GO-MAP) or Office of Minority Affairs (OMA) on student recruitment and retention? How is your unit involved in collaborative or university-wide efforts to increase the diversity of students and faculty?

DXARTS Assessment

5. Has the increased diversity of the student body and/or faculty in your department generated any changes in your curriculum? In your unit's academic culture or climate? If so, what are the impacts of these changes? Is there anything the University or College can do to help you with these efforts?

DXARTS Assessment

### Questions Regarding the Degree Programs

1. Doctoral program(s) (if applicable)
  - a. Describe the objectives of your doctoral degree program(s) in terms of student learning and other relevant outcomes, as well as its benefits for the academic unit, the university, and region. Compare your objectives with those for programs at institutions you think of as peers. (Please attach a curriculum description as an appendix to this report.)
  - b. Describe the standards by which you measure your success in achieving your objectives for doctoral program(s). Using these standards, assess the degree to which you have met your objectives. Indicate any factors that have impeded your ability to meet your objectives and any plans for overcoming these impediments.
  - c. How do you inform your students of and prepare them for the breadth of opportunities and career alternatives available within and outside of the academy? This would include careers in industry, for instance, as well as academic careers in institutions other than research-intensive universities.
  - d. How are you staying informed of the career options that graduates of your program typically pursue and the success they are obtaining? How are you using this information in departmental planning?

DXARTS Pedagogy

DXARTS Successes

2. Master's degrees (if applicable, as separate from Doctoral degrees)
  - a. If applicable, show the relationship of master's degree programs to the undergraduate and/or doctoral degree programs in your unit. Describe the objectives of your master's degree program(s) in terms of student learning of the content of your field, professional skills, skills for lifelong learning, and other relevant outcomes, as well as its benefits for the academic unit, the university, and the region. (Please attach a curriculum description as an appendix to this report.) In the case of a terminal master's degree, (one not generally undertaken as a prelude to doctoral study), compare your objectives with those for programs at institutions you think of as peers.
  - b. Describe the standards by which you measure your success in achieving your objectives for master's program(s). Using these standards, assess the degree to which you have met your objectives. Indicate any factors that have impeded your ability to meet your objectives and any plans for overcoming these impediments.



- c. How are you staying informed of the career options that graduates of your program typically pursue and the success they are obtaining? How are you using this information in departmental planning?

There is no terminal M.F.A. degree in DXARTS

3. Bachelor's degrees
  - a. Describe the objectives of your bachelor's degree program(s) in terms of student learning of the content of your field, professional skills, skills for lifelong learning, and other relevant outcomes, as well as its benefits for the department, university, and region. (Please attach a curriculum description as an appendix to this report.)
  - b. Describe the standards by which you measure your success in achieving your objectives for undergraduate programs. Using these standards, assess the degree to which you have met your objectives. Indicate any factors that have impeded your ability to meet your objectives and any plans for overcoming these impediments.
  - c. In what ways have you been able to involve undergraduates in research programs in your unit? How do you assess the results? What other teaching innovations have your faculty undertaken or are your faculty considering?
  - d. Indicate the steps the unit has taken to comply with state-mandated accountability measures (i.e., reduced time to degree; increased graduate efficiency index; increased retention rate). Have these steps improved the quality of student learning in your program? Why or why not? Do you envision any further steps to increase compliance with state-mandated accountability measures?
  - e. How are you staying informed of the career options that graduates of your program typically pursue and the success they are obtaining? How are you using this information in departmental planning?

DXARTS Pedagogy  
DXARTS Successes

### Questions Regarding Graduate Students

1. Recruitment and retention
  - a. Please describe recruitment/outreach programs to attract graduate students. Specifically address outreach to underrepresented groups. Describe the measures you use to assess the success of your efforts. How successful have they been?

DXARTS Pedagogy  
DXARTS Successes  
DXARTS Assessment

- b. What are your retention rates for master's and doctoral programs? To what do you attribute attrition? What steps are taken to minimize attrition?

DXARTS Pedagogy

2. Advising, Mentoring and Professional Development
  - a. In what ways do you communicate academic program expectations to students? Such information should include: timelines, phases and benchmarks of the degree program; procedures for committee formation; coursework, exam and presentation requirements; and standards of scholarly integrity.

DXARTS Pedagogy

- b. In what ways do you inform students of your unit's graduation and placement record? Such information should include time to degree; average completion rates (Master's

and Ph.D.); and employment of graduates two and five years after degree completion.

DXARTS Pedagogy  
DXARTS Successes  
DXARTS Assessment

- c. Please attach an example of your departmental mentoring/advising plan. Such information should include evidence that each students' work and progress are being evaluated on at least an annual basis and that the results of the evaluation are communicated to the student.

DXARTS Pedagogy

- d. Please attach a copy of your professional development plan. Such a plan should address questions such as: "What are the career opportunities for a master's or Ph.D. graduate in your field?" "What skills/experiences contribute to success in the various academic and non academic career paths listed above?" Include information on conferences students are encouraged to attend and how they are prepared for the experience.

DXARTS Successes

3. Inclusion in governance and decisions  
a. In what ways do you include graduate students in the governance of your department?

DXARTS Infrastructure

- b. Please describe your grievance process and characterize the nature of any grievances that have been lodged over the past 3 years. If the characterization is likely to reveal any students' identities, please address this issue in a separate but accompanying document addressed to the Dean of the Graduate School.

Please see Appendix I

- c. For graduate student service appointees, please describe:
- i. Appointment process.
  - ii. Average duration of appointment.
  - iii. Mix of funding among the various appointments (teaching, research and staff assistantships, fellowships, traineeships).
  - iv. What criteria do you use for promotions and salary increases?
  - v. In what ways are graduate student service appointees supervised?
  - vi. What training do graduate student service appointees receive to prepare them for their specific role?

DXARTS Pedagogy  
DXARTS Assessment

# 0. Executive Summary

The purpose of the Center for Digital Arts and Experimental Media (DXARTS) self-study is to accurately report on and assess the success of the DXARTS program during the first five years of its existence at the University of Washington. The report will highlight DXARTS' unique history and evolution, its innovative structure, mission and goals, impact on the University and the fields of research it pioneers. It will study the program's growing strengths, as well as review the scale and depth of its pedagogical methods, commitment and learning goals. Finally, it will reflect on a range of critical needs required for sustainability, and strategic decisions that need to be made as a way to plan future programmatic directions.

DXARTS is a path-breaking new research center and autonomous degree-granting program unique to the University of Washington. The first of its kind in the world, the program establishes the UW as a leading institution for the creation and study of new and experimental genres of digital art and culture. DXARTS offers both B.F.A. and Ph.D. degrees, with concentrations ranging from digital cinema, computer animation, computer music, and sonic arts, to interactive performance systems, robotics, telematics and mechatronics. Designed around a revolutionary new model of creative practice, research, and discovery at the frontier of the arts, DXARTS supports the emergence of a new generation of hybrid artists by fostering the invention of new forms of art through expanded studio research that synthesize pioneering advances in digital computing, information technologies, science, and engineering.

At the experimental forefront in the study of new digital art and cultural genres, DXARTS is unlike any other academic unit. To create a climate in which experimentation and innovation are possible, all of the people at DXARTS are deeply committed to and embedded in interdisciplinary communities. Additionally, the DXARTS leadership creates and actively fosters a culture of opportunity for all of the DXARTS community members, including staff and the non-majors that contribute to our classroom environment.

## 0.1. DXARTS Mission

The commitment to the distinctive strengths of DXARTS is captured in the unit's mission statement. The central strength of DXARTS comes from the creative convergence of dedicated digital arts faculty from the visual and performing arts, music, design, architecture, humanities, engineering, and science disciplines. The broad matrix of interrelated research activity provides the foundation and serves as a central feature in the creation of the new and emerging technology based art forms that are invented in DXARTS. The collected rich perspectives and resources are uniquely organized in DXARTS towards individual artistic vision, collaborative creative practice, advanced technology research and development, and critical scholarship. The program's main goals are designed:

- To harness the creative interactions among the faculty and their unique disciplines and serve the campus as an incubator for innovative research, education, artistic production, community and industry collaboration.
- To challenge basic assumptions about art and art practice, dissolve boundaries between disciplines in order to invigorate and intensify innovation and further question distinctions such as notions of art object and apparatus, theatrical performance and experiment, artist as author and audience as passive viewer.
- To develop sophisticated research, teaching methods and new technical means that promote the advancement of theory and generative practice necessary for continued growth and invention, and pursue a broad range of scholarly investigations that explore emerging philosophical and scientific issues in digital and experimental arts.
- To generate a pool of expert digital and experimental artists who work with the utmost technical sophistication, intellectual rigor, and artistic virtuosity in a rapidly emerging field
- To give digital artists the opportunity and equitable institutional support to attain the equivalent level of intellectual and professional achievement at the culmination of their graduate studies as their peers and partners in all areas of the Humanities, the Sciences, Engineering, and in the allied generative arts field of Music Composition and Computer Music, for which doctoral degrees are the normative terminal degree for graduate students.

- To support the University of Washington, other universities that are on similar paths, and still others that will follow our lead, to demand of digital arts students a new level of rigorous and original research and creative work by the final stages of their graduate studies and in all steps leading towards the conferral of the Ph.D. degree.
- To expect our graduates to create individual and significant artistic visions, a broad range of practical experience, and a body of substantial work they will need to prepare them for leadership roles in pioneering the new artistic and technical advances of the 21st century.
- To establish the University of Washington as one of the world's leading institutions for the creation and study of new forms of digital art and culture.

# 1. DXARTS History

During the past six years the College of Arts and Sciences and the University at large have witnessed the rapid maturation and remarkable success of the UIF funded research and academic programs in DXARTS. With the construction of its stunning laboratories and classrooms in Raitt Hall and Fremont completed, the strategic hiring of its first wave of world class permanent faculty, the design and implementation of more than 45 new innovative courses, and the creation of the new digital arts B.F.A. and the world's first Ph.D. program in its field, DXARTS has consistently achieved and surpassed every benchmark set before it. Its faculty, staff and students receive prestigious awards and commissions and perform and exhibit at the highest levels internationally in their fields. Without hyperbole, DXARTS has made deep and lasting history, become the national gold standard for digital arts research and inquiry, and has quickly emerged as an integral feature of the intellectual and academic vitality of the University, as well as forming a cornerstone for the invention of new interdisciplinary fields of creative arts and scholarly research in the College.

## 1.1. Timeline, Structural, and Funding History

To fully understand the present and future form of the program it is important to outline DXARTS' distinctive history. The creation and success of DXARTS is multivalent, and built on an illustrious and deep history at UW. Highlights of its timeline will be very briefly touched upon in this summary, as well as further illuminated throughout portions of the review document.

In the Fall of 1993, and with the approval of the Dean of the College of Arts and Sciences, John Simpson, the small and under utilized walk-in (word processor) center named The Humanities and Arts Computer Center (HACC), was asked to be re-envisioned by the Dean. The new HACC Director Richard Karpen pushed forward a boldly reinvented facility that became The Center for Advanced Research Technology in the Arts and Humanities (CARTAH). CARTAH's primary mission was radically different than HACC as its new staff and facilities supported advanced project-based digital research across the arts and humanities including, video, audio, text and design. In quick succession and built on a solid track record of success with campus wide interdisciplinary technology-based arts and humanities research projects sustained through CARTAH, its founding director, Music faculty member Richard Karpen, and three other entrepreneurial UW faculty, Shawn Brixey from the School of Art and David Salesin and Tony DeRose from Computer Science applied jointly for and received a substantial multi-year financial commitment from both Silicon Graphics Industries and Alias|Wavefront to build a world class Laboratory for Animation Arts (LA2) at UW under the unique direction of two College's and multiple faculty.

Telescoping the success of both CARTAH and the LA2, in 1999 Karpen and colleagues from three departments were awarded a highly competitive internally funded a two-year, 550,000 dollar Tools for Transformation grant for a new "Advanced Arts Technology Initiative" in the College of Arts and Sciences. The 1999 grant was used to greatly expand CARTAH's mission and scope of engagement, and embark on expanding its staff and the exploratory hiring of visiting artists and research fellows, and to launch a modest curricular dimension to the existing research center. The initiative produced numerous successes including a major new experimental video, sound and space exhibition, *Terraform*, which was designed and premiered at the Henry Art Gallery. In 2001, based on the strength of its substantial progress and success, Karpen and a faculty team, including three new members from three colleges, received a 700,000 dollar annual and ongoing grant from the University Initiatives Fund (UIF), an internal UW sponsored program to be administered inside the College of Arts and Sciences. The new UIF was created to establish revolutionary new doctoral and undergraduate arts degree programs and a major research center on a permanent basis. Named the Center for Digital Arts and Experimental Media and branded "DXARTS," it would be unlike any other arts program before it and unique amongst interdisciplinary media programs on other major research campuses.

DXARTS was designed from the ground-up to be a genuine "bricks and mortar" center and degree granting program under whose rubric the majority of advanced digital and experimental arts research activities at UW are coordinated. In 2001, the lead PI for the proposal, Richard Karpen of Music, was named the new Director. In 2001 and 2002 faculty earmarked funds from the DXARTS UIF budget to conduct international searches and hire two new faculty members to join DXARTS. The two faculty

members were a junior faculty hire in computer music from Stanford University, Juan Pampin (one of the "Tools" funded research associates who came in 1999), and a senior faculty hire, Shawn Brixey, who was recruited back to UW from the University of California Berkeley to be the co-founder and Associate Director of DXARTS. Brixey left UW in 1998 to found Berkeley's revolutionary Center for New Media, and to be one of the architects of the system wide Digital Arts Ph.D. program for the University of California. Once on board, the new core DXARTS faculty and a growing list of affiliate faculty from across campus began the long and arduous process toward the design, creation and approval of the innovative Ph.D. program the UIF was intended to support. Historical precedent was being set at both the university level, as well as nationally in a rapidly growing research and creative arts discipline. Despite initial resistance to change in the academy, with speed, efficiency and remarkable effort from the new DXARTS team, deep support from the College of Arts and Sciences, Dean of the Graduate School and the Provost, the DXARTS Ph.D. proposal reached its first historical academy benchmark and was approved unanimously -- and with a standing ovation -- in 2003 by the Board of Regents and HEC Board in just over 10 months.

With the Ph.D. program firmly established, the DXARTS' core faculty began three more major projects: the creation of the undergraduate degree program, the creation of more than 45 "new" courses that would form the revolutionary core of the curriculum, and the 1.3 million dollar major remodel of Raitt Hall.

The creation of completely new courses was a huge investment and gamble for DXARTS, but it distinguishes the program apart from many peer institutions working in the field -- as most cobble together existing classes into their degree programs. The large scale construction project parallel to the new integrated curriculum included the creation of numerous new state-of-the-art laboratories, classrooms and offices in Raitt Hall that would become the permanent home of the new program. The building project required substantial time and faculty commitment to build these unusual new facilities on campus. After three unsuccessful but important iterative design rounds with leading architecture firm ARC, the DXARTS faculty set down and drew up the final design plans in-house and scheduled construction for 2003-2004. To further accelerate and streamline the construction process, as well as provide substantial cost savings, DXARTS' Directors Karpen and Brixey joined the construction management team, and brought the construction project in on time and under-budget, thereby saving departmental funds that could be put directly back into the program. A large infusion of equipment and resources donated from Apple Computer and Avid Technologies in the same period fulfilled the push concurrently.

Beginning in 2004, another successful faculty search was conducted and the program hired animation and modeling expert Stephanie Andrews from PIXAR. Two further international searches for post-doctoral researchers were also held, and yielded leading roboticist James Coupe from South Bank University in the U.K. and computer music composer Josh Parmenter from the University of Washington. Parallel with the structural progress, the teaching of new courses, faculty and staff hiring, and infrastructure construction, DXARTS admitted its first ever group of doctoral students and undergraduate majors in autumn 2004 to be the pioneers of a new era in art research and creation. In the spring of 2004, Dean of the College of Arts and Sciences David Hodge invited DXARTS to be the highlighted program for the College's major Celebration of Distinction (COD) Award ceremony. The COD Award Ceremony honors some of the University's most outstanding alumni by bestowing upon them the College's Distinguished Alumnus Award. The ceremony is attended by more than 700 people and pays tribute to important programs in the College that are producing the unique kind environment that supports the development of individuals with the kind of life long learning and commitment that the Distinguished Alumnus Award is meant to honor.

By winter 2005, with the faculty and doctoral cohort growing exponentially, the need for more studio space, large-scale precision fabrication space, sound and film stage, CNC machining facilities, electronic system design laboratories, and a multitude of other needs became critical. An intensive search for more space began, and a superb 5500 square foot off-campus site 10 minutes away in Fremont was located, and the DXARTS directors, with the help of the University real estate office, secured a long-term lease of the building and began its conversion and full build out. The Fremont Laboratory, affectionately known among the cohort as the "Mont," is now home to world class design, construction and fabrication facilities including circuit board printing, electronics fabrication, large scale robotic plasma cutting, full ferrous metal CNC machine shop and woodshop, stereo HD cinema, lighting, motion control and more.

By 2006 the DXARTS doctoral cohort had risen to 14 and was a phenomenally diverse group including women and men from China, Korean, Japan, England, Poland, Mexico, New York, Chicago, San Diego, San Francisco, and Seattle. Their primary backgrounds as artists were poly-mathematic and ranged from architecture, music, filmmaking and dance, to industrial design and engineering. Further, in 2006, the first group of undergraduate B.F.A. majors received their degrees, and exhibited their work at Consolidated Works Gallery in Seattle. The *Stranger Magazine* claimed it was the single best student art show in the region, and that it was, "a bullet to the head shot not from a gun, but from a particle accelerator." DXARTS' B.F.A.'s applying to graduate school received 100 percent acceptance of admission to prestigious graduate programs including NYU, Columbia, UCLA, School of the Art Institute of Chicago, and University of Illinois Chicago. Another graduating major was quickly hired by Adobe to work on its suite of innovative new real-time video processing software development, and another was hired as studio assistant to the renowned video artist and MacArthur fellow, Gary Hill. Equal to the impressive growth of the doctoral program, by 2006, five of the first six doctoral students admitted to the program had completed their qualifying examinations, and one had completed the first general examination. The faculty Graduate School Representative (GSR) present from UW Bioengineering for the first DXARTS general examination stated it was "unequivocally the most rigorous general examination they had ever witnessed." DXARTS has also had a 100 percent success rate of its first round draft of graduate students accepting offers of admission every year since inception.

In late 2006 there was a major shift in DXARTS. Richard Karpen was appointed Divisional Dean for Research and Infrastructure in the College of Arts and Sciences, and Shawn Brixey was appointed as sole Director of DXARTS. While these moves are clearly examples of success of DXARTS and its faculty, the structural shift was in reality a net loss of two faculty positions in DXARTS. Because the organizational structure was designed with two Directors, allowing both faculty deep teaching and research in the cohort while jointly running the program, the change in personnel had a significant effect. In 2006 the program requested re-capture of the two lines to rebuild the faculty size to the level necessary to run the program. It received one, and in 2007 DXARTS completed an international search for Dean Karpen's re-captured faculty line in Mechatronic and Robotic Art. The intra-college search committee unanimously selected DXARTS Research Fellow and roboticist James Coupe as the new faculty hire. DXARTS faculty positions have been temporarily completed as joint appointments in host units such as Music, Dance, Art and Design, where each is typically arranged as percentage of seats in DXARTS highly sought after classes.

By the end of 2006 DXARTS had embarked on a wide range of new initiatives sought to further build collaboration, innovation and integration among allied programs across the campus and the community. Selected new initiatives included:

- A twice annual large-scale public performances of experimental video and computer music.
- A biennial dance technology project entitled *Dancing in the Digital Domain* that pairs M.F.A. dance choreographers with DXARTS doctoral students in a year-long intensive designed to invent, stage and perform radical new hybrid works.
- A joint doctoral seminar with the "Intellectual Property" JD Law students that uses DXARTS research as case studies to gauge efficacy of current IP law in the growing field of digital media.
- A joint DXARTS and Electrical Engineering course in haptics that has already produced numerous awards and a forthcoming DXARTS dissertation in the field.
- A major library initiative entitled CODEXA, which is part of a Mellon Foundation funded "Digital Libraries Initiative" to design, build and support a permanent "fully digitally native" archive that will use DXARTS research as a extensible new model for the library system to capture, archive, score and notate complex data for all emerging digital disciplines.
- A newly created 50TB Apple XSAN enterprise server system, and a 250Gflop computing grid to serve the research needs for real-time audio wave front and stereo HD image synthesis, as well as a host of other high performance computing needs,
- A design for a strategic plan for a major new "experimental digital cinema" program at the UW housed and run as an integral part of DXARTS.

With DXARTS restructured and now fully incorporating the oversight and management of CARTAH, its four existing fulltime staff positions were expanded to provide expert staffing of research projects, classrooms, technical resources, fiscal support and administrative management for the program. However, with DXARTS' growth, the increase in demand for the major, its courses, and research partnerships, two

more key staff positions in advising and computer controlled machine shop management were added in 2006 and 2007 respectively. The hire of Cynthia Caci as Director of Academic Student Services -- previously the University's lead undergraduate advisor -- was critical to DXARTS, both as a strategic personnel hiring, and for key development issues of our outreach programs, creating our honors and study abroad programs, recruitment, and in assisting under-represented students. Adding advising staff was also structurally important to manage seamless through-output as the DXARTS major is complex, often a double or triple major in areas such as Computer, Science, & Engineering (CSE), Comparative History of Ideas (CHID) and Psychology. Further, with serving more than 750 non-majors a year in DXARTS by setting aside nearly 50 percent of our seats for these students in most courses, as well as most courses being graduate level in content and in rigor with a significant number of those courses being year long sequences, assisting students with highly integrated vertical and horizontal advising in DXARTS and across campus is extremely important. The funding for the advising position is based on soft-money, and is allocated only for the duration of Brixey's tenure as DXARTS' director.

Incoming freshman applicants to the University are asked to indicate their area of academic interest as part of the University application process. By 2006, DXARTS was second only to the School of Art as the arts major in highest demand at the University. This is especially interesting to note considering that DXARTS is 12 times smaller in faculty size and 20 times smaller in allocated space than the School of Art. Though Art, Business, and Computer Science are considered some of the largest and most popular undergraduate degree options available at the UW, for the incoming class of 2007, the demand for DXARTS as expressed as a ratio of student interest to the number of departmental faculty ranked higher (at 32:1) than that for Art, Business and Computer Science each of which ranked lower (at 9:1). In winter 2006 DXARTS began closely observing course applications data and it shows trends of continual denial of between 20-75 students per class, amounting to 100's of denials per year because of the size constraints placed on it by the initial faculty and space allocation of the UIF. In spring of 2006, DXARTS rolled out four new specially designed one quarter 400 level intensive service courses in digital video, digital audio, sensing and control systems and interactive 3-D to address some of this problem. These unique courses are designed to further serve the growing demand for our classes across campus but also create an alternative to accommodate the high demand for our year long courses that often receive hundreds of applications each.

In 2007, a new post-doctoral research fellow David Halsell from Carnegie Mellon University was added in experimental video, and DXARTS launched both its Honor's Program, as well as inaugural Study Abroad Program, with a 6-week intensive HD Video "Exploration Seminar" located in both Tunisia and Sicily. With all initial faculty and researcher searches completed, all staff positions filled, the cohort stands at its current total of 17 doctoral students, 45 undergraduate majors, 750 non-majors, five and three quarters staff, three faculty, two Research Fellows, and one Director.



## 2. DXARTS Research

Art as research is not a new phenomenon. The processes of imagination, exploration, discovery, and reflection are universal among artists, scholars, scientists, and engineers. All seek paths of unique discoveries that will improve our lives and communicate our understanding of the world around us. The digital era brings with it remarkable new promise in these endeavors. However, at the same time, it places fundamental and substantial new requirements on artists who seek to engage in more than being simply “users and consumers” of existing technology, but instead wish to pioneer the most advanced artistic discoveries and inventions in the field. To support the highest level of this promise DXARTS covers a vast range of arts practice, collaborative exploration, technical invention and creative research across multiple disciplines.

While areas such as Digital Cinema, Computer Music, Computer Animation, Sensing and Control Systems, Mechatronics, Robotics and Telematics, need initially to be viewed, and to some degree taught, as separate areas of research and practice, there is so much overlap and collaborative synergy between them at higher levels of faculty and doctoral practice that clear lines of division at the advanced level are not as meaningful and in practice can impede innovation, much the way medicine, science and engineering have witnessed. Each area of digital and experimental arts encompasses a specific mixture of the same set of disciplines as each of the others, but the mix is uniquely balanced in each research genre. Viewed comprehensively, one finds a fine-mesh network of vibrant interdisciplinary interactions between them all. The DXARTS program takes advantage of this convergence to create a distinct multidisciplinary community of artists, researchers and scholars whose work is best identified collectively as belonging to Digital Arts and Experimental Media. All of the areas depend on the collaboration of artists, engineers, and scientists for their current existence and continued growth in terms of discovery and application. All challenge assumptions about the traditional arts areas from which they emerged as well as the engineering and science disciplines with which they interact. Together they form a powerful nucleus of knowledge, expert skill, and innovation that has distinctive strength because of its interdisciplinarity.

### 2.1. DXARTS Five Primary Areas of Research

Over the last five years, DXARTS has emerged as an incubator and highly successful model of interdisciplinary practice both on campus and internationally. As such, DXARTS provides a very broad context from which to approach digital arts, seeing it as inclusive of a wide range of canonized as well as wholly unexplored new experimental art genres, histories and practices. DXARTS is largely based upon five core areas of investigation: visual synthesis, aural synthesis, algorithmic processes, sensing and control systems, and telematics.

The core area of Visual Synthesis emerges primarily out of the confluence of film, spatial imaging, machine vision, virtual reality, and yet it crosses over daily into digital sound, and computer programming and haptics. DXARTS considers Visual Synthesis to be a foundational practice along with Aural Synthesis. Visual Synthesis is one of the foundational disciplines in DXARTS. Contemporary imaging technologies such as cinema, film, stereo imaging, holography, machine vision, and virtual reality all expand the field of human visual perception, offering up new possibilities for another generation of artists. Fundamental to this expanded field is the opportunity to challenge traditional representational modalities, moving beyond static, simulative and illustrative media, and seeking to build generative work that incorporates innovative temporal structures, systems of perceptual engagement, audience and site in radical new ways.

DXARTS' approach to visual media thereby focuses equally on new and historical strategies of alternative and experimental moving image-making, and also upon the synergistic exploration of the “architecture of time,” creating new methods of temporal structures that are experienced in large part through new systems of visual perception. At DXARTS, Visual Synthesis includes Experimental HD Digital Cinema Stereo Imaging and Holography Virtual Reality and Stereo Immersive Environments, 3D Modeling and Animation, Interactive Installation and Performance Systems, and Real-time Digital Video Synthesis, Graphics, and Effects. Important contributions have been made to this field by our faculty and doctoral students, including Shawn Brixey's *Altamira* project that uses retinal electrophosphenes generated from pulsars in deep space to explore our evolutionary neurobiology, to James Coupe's public art installation

*(re)collector*, in which cameras installed throughout Cambridge city center were programmed to extract cinematic behaviors from people's everyday activities, which were then recombined together to generate feature films.

Another core area, Aural Synthesis, encompasses computer music composition, digital signal processing, ambisonics and holophonics, as well as high level ultrasound research and more. Aural Synthesis' dialogue across DXARTS is equally wide, touching performance systems and telepresence. At DXARTS, Aural Synthesis includes Computer Music Composition, Ambisonic and Holophonic Sound, Digital Signal Processing, Sound Design and Sound Art, and Interactive Installation and Performance Systems. Examples of the artistic production in this area include Richard Karpen's piece *Aperture*, for viola and live electronics, for which the performer wears a custom designed wrist device and associated software for sensing bow articulation, speed, and angle and Juan Pampin's *Catch 22 Goes Online* is a bold example of the interaction of Aural Synthesis with Telematics. For this piece two remote locations were connected sonically through the Internet, exchanging the acoustics of the two places using 3D audio processing algorithms, giving the impression to the visitors of the installation of being present simultaneously at both locations.

While Algorithmic Processes (or computer programming) is imagined as having genres and areas unique to its own practice such as database and interface, and information art, in reality it is one fully common and shared practice across all disciplines of DXARTS. It also provides deep access to other modes of practice and research across science and engineering disciplines allowing artists and scientists to share complex investigative processes within common hierarchical languages. At DXARTS, Algorithmic Processes includes Computer Programming and Algorithmic Art, Database and Interface Art, Hybrid Gaming Systems, and Hybrid Performance and Dance Technology.

Sensing and Control Systems is engaged with the creation of highly complex system based art forms that sense the world in scales from satellite data and the natural environment to other "like" art forms, as well as sensing themselves. Like Algorithmic Processes, Sensing and Control Systems has its own unique practice such as haptics and robotics, but increasingly is embedded in each area of practice in DXARTS and allows the sharing of aesthetics, technology and conceptual reasoning throughout the program. At DXARTS, Sensing and Control Systems includes Haptics and Human Computer Interaction, Interactive Media, Mechatronic and Robotic Art, Interactive Installation and Performance Systems, Hybrid Gaming Systems, and Hybrid Performance and Dance Technology.

Finally, Telematics is the study and creation of all forms and levels of situatedness, agency, presence and absence. Telematics includes hybrid mechatronic systems, kinetic input, tactile displays and robotics as well as telepresence. Telepresence is only one procedural embodiment of "telematics," an embodiment where one feels present in a "real physical location," whilst actually being absent and remote from it. Rather than seeing telematics as strictly a conversational interaction between people over distance, DXARTS practices a broader, less anthropocentric interpretation that involves networked collaboration between humans and other systems (physical, biological, and human-made), thus permitting us to engage with structures vastly more complex and at different scales than ourselves. At DXARTS Telematics includes Telepresence, Biomedica and Genomic Art, Interactive Installation and Remote Performance Systems, and Mechatronic and Robotic Art. Research produced by DXARTS faculty, such as Shawn Brixey's *Altamira* Juan Pampin's *Tropos* and James Coupe's *Difference Engine* all demonstrate a commitment to telematics.

Each of these areas of digital and experimental arts is essentially anchored in a core practice such as "computer music composition, digital cinema or robotics," but practically, and in the final expression of the work, they are all very likely to encompass a complex and nuanced mixture of multiple disciplines from across DXARTS. Viewed comprehensively, one finds a fine-mesh network of vibrant interdisciplinary interactions and shared intellectual and research literacy between each field as it is practiced and taught. While the first three of these areas could seem to fit comfortably within the general digital arts paradigm -- and our facilities in Raitt Hall manage these research areas well -- they have blurred so significantly in the fertile soil of the program, that they look much different than they would be practiced anywhere else. The last two areas are in part responsible for this phenomenal transformation. They have become increasingly central to the research carried out by our faculty, students, and all the allied science and engineering units that participate in DXARTS courses and research endeavors. Effectively this

distinguishes DXARTS from other programs in its field, and has required a radical reconsideration of studio practice for the next generation of digital artists.

## 2.2. DXARTS Research Community

The DXARTS research community not only encompasses the core UIF funded DXARTS faculty. Deeply involved in the DXARTS research mission are non-funded core faculty, research fellows, affiliate faculty from an array of disciplines, a distinguished group of visiting scholars, DXARTS staff, and our graduate and undergraduate students. DXARTS considers the entire interdisciplinary community as synergistic team, and central to its success. Figure 1 is an organizational chart of DXARTS.

**Figure 1: DXARTS Organization**



### 2.2.1. Faculty, Staff, and Graduate Students

The DXARTS community not only benefits from each community member's individual excellence, but the highly unique institutional form of organization as expressed and practiced by DXARTS. This practice is explicitly structured to create a rich environment of inclusion in which every community member whether staff, student, faculty, or visitor can lead, participate and reinforce broad experimentation and excellence, reflecting DXARTS' investment in the foundational ideal of a truly interdisciplinary community and sustaining the most creative opportunities for that community.

The faculty in DXARTS are arguably some of the best in the world. They have imagined and successfully pursued unparalleled interdisciplinary career paths, staked out the highest possible achievements in their fields, continually receive prestigious awards and recognition, and have undertaken revolutionary artistic and technical research that continues to inspire others in this and allied fields. The faculty and their work continue to provide the single most powerful tool to recruit new faculty and doctoral students to campus, and to expand one of the College's most powerful new assets and compelling horizons

Additionally, along with the DXARTS core faculty funded by the UIF, the program also is honored to host a number of zero to 100 percent non-funded core faculty positions that offer both the opportunity for full interaction with the program, its faculty, laboratories, and doctoral students.

The relationship of the non-funded core faculty to the program is a distinct feature of DXARTS. Specifically, DXARTS' novel zero percent core faculty structure also goes one remarkable step further by conferring voting rights on these faculty including new tenure track and zero percent faculty appointments, doctoral admissions, and curricular innovation. These positions are also offered direct Teaching Assistant funding support for "joint" courses designed with DXARTS and their home department. This highly unusual feature provides real engagement for this faculty group, and it appropriately awards their "sweat equity" by empowering them with more than the traditional rhetoric or lip service paid to "interdisciplinary ideals" by providing them with an appropriate ownership and voice in the ultimate direction, growth and vision of the program.

DXARTS also benefits from the contributions of research fellows, visiting scholars, and affiliate faculty. The types of projects and the diversity of these individuals' home departments serves to further illustrate DXARTS' deeply interdisciplinary community.

Finally, the DXARTS staff contributes deeply to the overall research mission through their own research projects, campus wide and global initiatives, as well as through their creative programmatic innovations and work building inter-departmental ties.

#### **DXARTS Core Faculty**

Following are an overview of the faculty. However, the collected Curriculum Vitae of the DXARTS Core Faculty can be found in the appendices.

**Shawn Brixey** (b. 1961) Director and Co-Founder of the Center for Digital Arts and Experimental Media (DXARTS) at the University of Washington. Previously, he was Director and founder of the Digital Media Program at the University of California Berkeley. A graduate of MIT's CAVS/Media Lab, Brixey has exhibited art and technology works internationally, including Documenta, the Deutscher Kunstlerbund, Karlsruhe, The Cranbrook Art Museum, The MIT Museum, The Contemporary Art Center of Cincinnati, The Chicago Art Institute, The 1998 Winter Olympics, The first American Design and Architecture Triennial at the Cooper Hewitt National Design Museum, New York, AME at Arizona State University, The Henry Art Gallery, University of Washington, and the Berkeley Art Museum. He has received all levels of major grants and awards, to support his research including: Apple Computer, AVID Incorporated, The Boxlight Corporation, The Intel Corporation, Silicon Graphics, The National Institute of Health, The National Endowment for the Arts, The Corporation for Public Broadcasting, Leica and Hughes Aircraft. In 2003 he was honored with a prestigious Rockefeller Foundation Fellowship for New Media, past fellows include Bill Viola and Gary Hill.

He lectures widely in the U.S and Europe on new and emerging media art forms. Critical writing and reviews of his work have been featured in diverse sources, including *The New York Times*, *The Boston Globe*, *The San Francisco Chronicle*, *The Seattle Times*, *The Cincinnati Inquirer*, *The Stranger*,

*The Guardian, Wired Magazine, Surface Magazine, The Chronicle of Higher Education, Art News, WolkenKratzer Magazine* (Germany), *Smithsonian World Television*, and KQED/MSNBC Radio. Significant review of his work is included in Thames and Hudson's 1992 book release, *Art of the Electronic Age, Information Arts, The Intersection of Art, Science and Technology* by Dr. Stephen Wilson, 2002 from MIT Press, and the major new hardcover book, *From Technological to Virtual Art*, by renowned historian Frank Popper, MIT Press, 2007.

**Richard Karpen** (b. 1957) Founding Director of the Center for Digital Arts and Experimental Media (DXARTS) at the University of Washington and currently serves as Divisional Dean for Research in the College of Arts and Sciences. He is also Professor of Music Composition and Theory. He has been the recipient of many awards, grants and prizes including those from the National Endowment for the Arts, the ASCAP Foundation, the Bourges Contest in France, and the Luigi Russolo Foundation in Italy. Fellowships and grants for work outside of the U.S. include a Fulbright to Italy, a residency at IRCAM in France, and a Leverhulme Visiting Fellowship to the United Kingdom. He received his doctorate in composition from Stanford University, where he also worked at the Center for Computer Research in Music and Acoustics (CCRMA). Karpen is a native of New York, where he studied composition with Charles Dodge, Gheorghe Costinescu, and Morton Subotnick.

Karpen is a leading international figure in Computer Music. He is known not only for his pioneering compositions, but also for developing computer applications for composition, live/interactive performance, and sound design works are widely performed in the U.S. and internationally. While he is primarily known for his work in electronic media, Karpen has also composed symphonic and chamber works for a wide variety of ensembles. Furthermore, he has composed works for many leading international soloists such as soprano Judith Bettina, violist Garth Knox, trombonist Stuart Dempster, flutists Laura Chislett and Jos Zwaanenberg, and oboist Alex Klein. Along with numerous concert and radio performances, his works have been set to dance by groups such as the Royal Danish Ballet and the Guandong Dance Company of China. Karpen's compositions have been recorded on a variety of labels including Wergo, Centaur, Neuma, Le Chant du Monde, and DIFFUSION i MeDIA.

**Stephanie Andrews** (b. 1973) is an experimental media artist who uses techniques of illusion and transformation to bring people into her work as active agents of perception. Her work utilizes technologies such as digital imaging, motion-capture data, alternative platforms for multi-dimensional kinetic animation, video, neon, and computer-controlled pneumatic systems to create screen-based and installation-oriented work. She is a University of Washington alumna, having earned a B.A. in Art in 1996, where she concentrated in computer graphics, photography, and printmaking. Before returning to the UW as an Assistant Professor in fall of 2004, she was an Instructor of 3D Animation and Computer Lighting/Rendering at the School of the Art Institute of Chicago. She also earned her MFA in Art and Technology from SAIC in 2002. She has had additional training at the California College of Arts and Crafts, Bay Area Theatre Sports, and the University of California, Berkeley. Previously, Andrews was a Technical Director of 3D graphics for Pixar Animation Studios on the award-winning films *A Bug's Life* and *Toy Story 2*. She has shown her work in galleries and museums in Chicago, New York, San Francisco, and the UK.

**James Coupe** (b. 1976) Assistant Professor DXARTS. His work is concerned with systems, agency and control: he builds projects that aim to expose the scale, materiality and politics of information networks. Educated in Fine Art at the University of Edinburgh (Scotland) and Creative Technology at the University of Salford (England), his recent projects have included powerline networks, parasitical cellular phone agents, autonomous robot systems, self-organizing telephone call centres. His most recent installation, *(re)collector*, was commissioned as a public art work by Enter\_ in Cambridge, England, and involved a city-wide network of surveillance cameras programmed to extract cinematic moments from people's everyday lives and recombine them into feature films.

His work has been exhibited throughout the UK and abroad, including IDEA (Manchester), Camden Arts Centre (London), The Northern Gallery of Contemporary Art (Sunderland), Artsadmin (London), and The Junction (Cambridge). He has received numerous commissions that include New Contemporaries, Metapod, Low-Fi, SCAN and Lancaster City Council. He has also lectured internationally, recently including ISEA (Nagoya), CHART (Birkbeck College), State of the Real (Glasgow School of Art), CAA (Seattle and Boston), Pixelraiders (Sheffield Hallam University) and

SLSA (New York). The recent Bloc Press publication, *Remote*, includes his essay, "Art, Systems, Networks and Parasites," and another essay, "Art, Representation and Responsibility: Towards a System Aesthetic" has now been published as part of the book *The State of the Real: Aesthetics in the Digital Age*. His research has attracted substantial funding, including an AHRB Innovation Award in 2003/4 and commissions from the Arts Council England. Before coming to DXARTS, he worked as Senior Lecturer in Digital Art, teaching undergraduate and graduate level at Thames Valley University (London) and London South Bank University. Whilst at DXARTS, has been constructing a number of new art projects, as well as developing a range of courses involving mechatronics, telematics and robotics.

**Juan Pampín** (b. 1966) has been teaching at the University of Washington since 1999. He was appointed Assistant Professor of Music (Computer Music Composition) in 2002. Pampín received a M.A. in Composition from Conservatoire National Supérieur de Musique de Lyon, France and a D.M.A. in Composition from Stanford University. Juan Pampín's research has focused on Spectral Modeling of sound. He has also undertaken research in the areas of Perceptual Audio Coding and Sound Spatialization. His compositions, including works for instrumental, digital, and mixed media, have been performed around the world by soloists and ensembles such as Ardití Quartet, Les Percussions de Strasbourg, and Sinfonia 21. Recent commissions include those from GRAME in France and La Fábrica in Argentina. He has been Artist in Residence at LIEM-CDMC in Madrid, and IMEB in Bourges, France. His signal processing research has been presented at major international conferences, particularly his Analysis Synthesis Transformation (ATS) software project. He has taught at Stanford University's Center for Computer Research in Music and often lectures and gives master classes in a number of South American countries.

#### **DXARTS Zero-Percent Appointed Faculty**

Following are an overview of the DXARTS zero-percent appointed faculty. However, the collected Curriculum Vitae of these faculty members can be found in the appendices.

**Paul Berger** (b. 1953) has been at the University of Washington's School of Art for 24 years, teaching in the Photography program, which he co-founded in 1978. He has been working in the photographic medium since 1965 and in digital electronic media since 1981. Although trained in a classical photographic tradition, he has been primarily involved in digital manipulation of electronic images for the past seventeen years, and initiated a sequence of digital imaging classes within the photography curriculum beginning in 1985. He has had a book version of his series *Seattle Subtext* published in 1984, and a catalog to the Seattle Art Museum exhibition *The Machine in the Window* published in 1990. He has received two NEA grants, in 1979 and 1986, and has exhibited his photographic and digital artworks widely, both nationally and in Europe (New York 1999; Copenhagen 2001).

**Blake Hannaford** (b. 1956) is Professor of Electrical Engineering, Adjunct Professor of Bioengineering, Mechanical Engineering, and Surgery at the University of Washington. Hannaford received the B.S. degree in Engineering and Applied Science from Yale University in 1977, and the M.S. and Ph.D. degrees in Electrical Engineering from the University of California, Berkeley. From 1986 to 1989 he worked on the remote control of robot manipulators in the Man-Machine Systems Group in the Automated Systems Section of the NASA Jet Propulsion Laboratory, Caltech and supervised that group from 1988 to 1989. Since September 1989, he has been at the University of Washington in Seattle, where he is Professor of Electrical Engineering. He was awarded the National Science Foundation's Presidential Young Investigator Award, the Early Career Achievement Award from the IEEE Engineering in Medicine and Biology Society, and was named IEEE Fellow in 2005. His currently active interests include haptic displays on the internet and surgical robotics. He is the founding editor of *Haptics-e*, *The Electronic Journal of Haptics Research*, a member of the steering committee of the World Haptics Congress, and Co-Chair of the 2006 Haptics Symposium.

**Barbara Mones** (b. 1963) is a Senior Lecturer in Computer Science at the University of Washington, and works working developing innovative applications in the area of computer graphics and animation, both in academia and industry. For ten years, she was a tenured Associate Professor and the Founding Director of the Visual Information Technologies MA/M.F.A. Program, a course of study in multimedia, computer graphics and animation at George Mason University in Fairfax, Virginia. In addition, she designed and implemented training programs in the areas of digital

modeling, animation and 3D paint at DreamWorks/Pacific Data Images and Industrial Light and Magic. She also consulted in the area of computer animation training for the Disney Company. She has served as the Art Chair for the Education Committee, and Panels Chair for the 1997 conference and coordinated an international Student Animation Competition for the ACM/SIGGRAPH organization for the past seventeen years.

Mones worked for the White House and National Aeronautics and Space Administration on Al Gore's GLOBE Program, a project whose mission is to connect children from over the world to study satellite imagery and learn about the ecological impact of soil and water use. For this she was presented with a NASA Group Achievement award. She has lectured extensively on an international level on topics related to computer graphics, animation and curriculum development and has designed and executed her own graphics and animation that have been shown in many museums and institutions worldwide, including the Smithsonian Institution and the Villa Ciani Museum in Switzerland. Her animated work has been shown in the SIGGRAPH Electronic Theater.

### **DXARTS Research Fellows**

Following are an overview of the DXARTS Research Fellows. However, the collected Curriculum Vitae of the research fellows can be found in the appendices.

David W. Halsell (b. 1967) is a multimedia artist whose work attempts to synthesize seemingly disparate ideas such as perceptual consciousness, the ecology of mind, personal/social relationships with the natural world, and the constructions of time, through the use of video, installation and sound design. Halsell received his M.F.A. from Carnegie Mellon in 2007 after a B.F.A. in Sculpture from the University of Washington, graduating *cum laude* and as a Mary Gates Scholar. His works have been exhibited and performed at Madrid Abierto 2007, Digital Art Weeks 2006, ETH Zürich (Swiss Federal Institute of Technology), the Spark Festival of Electronic Music and Art at the University of Minnesota, the Zeppelin 2005 Sound Projects Festival at the Centre de Cultura Contemporània de Barcelona, and the Regina Gouger Miller Gallery in Pittsburgh, PA. His writings have been published in *NY Arts magazine* and the Spanish new media journal *a minima*.

Joshua Parmenter (b. 1972) completed his D.M.A. in Composition at the University of Washington, where he studied with Richard Karpen. He received his M.A. of Music in Composition in 2002 from the University of Washington. He received a B.A. in Music from the University of California, Berkeley, where he studied with Edwin Dugger and Jorge Liderman. Parmenter's music has been performed throughout the United States and Europe. He specializes in both acoustic and electro-acoustic music, especially music that combines performers with real-time electronics. An important part of his research has been in the development of real-time synthesis software as part of the SuperCollider open source project. He also uses the CSound and Common Music synthesis programs. Currently, his research is focused on extending the real-time analysis and performance tools in the SuperCollider programming language, as well as a suite of Ambisonic Unit Generators for sound spatialization. Parmenter's piece *Organon Sostenuto* for flute, bassoon, cello, double bass and live electronics was premiered last year in Copenhagen, Denmark by the Ensemble 4+ of Copenhagen. He is currently working on commissions for guitarist Tom Baker, double bassist Kristjan Sigurliofsson and clarinetist Jesse Canterbury, as well as a new work for double bass and live electronics for Irina-Kalina Goudeva.

### **DXARTS Affiliate Faculty**

Similar to the zero-percent faculty appointments, DXARTS also hosts numerous non-voting Affiliate Faculty Positions. These numerous positions provide for short term as well as strategic long-term interaction with the program, its faculty, laboratories, and doctoral students. The primary focus of these positions has been to allow faculty from other units to design and build "outcome specific" research as well as long-term project alignment with DXARTS. They also provide each program with a novel incubator for advanced research and as well as generating joint funding initiatives that support both programs but do not need to have direct daily engagement with DXARTS.

A small selection of affiliate faculty include:

- Les Atlas, Professor of Electrical Engineering, University of Washington
- Jennifer Bean, Assistant Professor of Comparative Literature, University of Washington

- Vladimir Chaloupka, Professor of Physics, University of Washington
- Ed Lawzowska, Professor of Computer Science and Engineering, University of Washington
- Jen Salk, Associate Professor of Dance, University of Washington
- Steve Tanimoto, Professor of Computer Science and Engineering, University of Washington
- Diane Thome, Professor of Music, University of Washington
- Phillip Thurtle, Assistant Professor of History, University of Washington

### **DXARTS Visiting Scholars**

DXARTS has a very active, dynamic and substantive “Visiting Scholars” program. A sizable percentage of these are artists, scientists and scholars who visit campus for a short duration of time, give widely publicized community lectures as well as engage in studio critiques, short-term experiments, and also teach small colloquia and seminars on a wide range of topics. A number of these “Visiting Scholars” however are conferred with full Adjunct Faculty status, placing them in the unit for up to three years at a time and providing the program with much greater interaction and important mind-share across the program and with allied units.

A small selection of visitors and adjunct faculty include:

- Gary Hill, Video Artist, MacArthur Fellow, Adjunct Faculty DXARTS, University of Washington
- Trimpin, Sound Artist, MacArthur Fellow, Seattle, Washington
- Pablo Di Liscia, Director, Electronic Music Composition, Universidad de Quilmes, Argentina
- Ken Goldberg, Professor of Electrical Engineering, University of California Berkeley
- Simon Penny, Professor of Art, Computing and Technology, University of California Irvine
- Lynn Hershmann, Professor of Art and Technoculture, Cornell University
- Heinrich Taube, Professor of Music Composition, University of Illinois at Urbana-Champaign
- David Cuarielle, Researcher Media Science, University of Chalmers, Sweden
- Eduardo Kac, Professor of Art and Technology, School of the Chicago Art Institute
- Doug Kahn, Director Technoculture Program, University of California Davis
- Gary Kendall, Professor of Music Technology, Northwestern University.
- Edward Shanken, Visiting Professor of Art History, University of California Los Angeles
- Stephen Wilson, Chair, Information Arts Program, San Francisco State University
- Sheldon Brown, Professor of Media Art, University of California San Diego
- David Birchfield, Professor of Computer Music, Arizona State University
- Jeff Han, Research Scientist, Courant Institute, New York University
- Steve Seid, Curator Film and Video, Pacific Film Archive, University of California Berkeley
- Micheal Rees, Professor of Sculpture, Rutgers University

### **DXARTS Staff**

The DXART administrative and technical staff are equally polymathematic and celebrate the same diverse backgrounds and achievements as the faculty. All of the current staff except one have been hired under the new Director, and were selected both for their outstanding abilities, record of accomplishments, and also their interest in creating innovative new systems and programs in DXARTS. Among their other accomplishments, all but two of the current staff have graduate degrees.

**Peter Brun** (b. 1983) is Manager of the DXARTS Fremont Laboratory. A graduate of the DXARTS and Photography programs at UW, Peter’s primary area of expertise is in system design, CAD/CAM, computer numeric control machining, and fabrication.

**Jessica L. Beyer** (b. 1976) is a DXARTS Graduate Student Assistant. She works with Cynthia Caci and Shawn Brixey on projects to expand DXARTS role in the community both on and off campus. She is a Ph.D. candidate in Political Science. Her doctoral research focuses on youth congregating in social locations online. She analyzes the generation of community and the development of political consciousness in these spaces.

**Cynthia Caci** (b. 1957) joined DXARTS as Assistant Director for Academic Services. Prior to this, she served in numerous capacities at the University of Washington. While completing her graduate degree in Art History, Cynthia was an undergraduate adviser in the School of Art. She then moved to the Undergraduate Advising Center (Gateway Center) as an academic counselor, working primarily with students in the fine and performing arts. In DXARTS, she continues to counsel



undergraduates as well as coordinate the Ph.D. program. Other roles include curriculum management and development, research and documentation for the Center, outreach to prospective freshmen and transfer students, and development of external partnerships for funding and support.

**Billie Grace** (b. 1972) is the current Administrative Specialist for DXARTS. She comes to DXARTS after working for the UW Dean of Public Health for seven years in their administration and finance division. She earned her B.F.A. in Art History from the University of Washington in 2001 and is currently working towards a Master's in Library and Information Science. Her areas of expertise are in the visual and performing arts, administration, as well as digital collections. She is thrilled to be working back in the arts and sciences and is looking forward to assisting DXARTS faculty and students purchasing equipment and taking care of their personnel and payroll needs. She hopes to promote creativity, learning, and exploring new ideas.

**Johnathan Lyon** (b. 1981) currently Senior Computing Specialist and general technical guru at DXARTS/CARTAH, received his B.F.A. in DXARTS and B.S. in Digital Signal Processing (General Studies) at the University of Washington in 2006. He specialized in spatial audio processing, discovering novel ways of treating audio granually in space in order to morph the topology of three-dimensional sound spaces. He is still a student at the University of Washington, where he is continuing research in Bio-Enhanced Interface Design and Technological Mediation in the Arts. He is also a new member of Juan Pampín's ATS research group where he is working on building a graphical interface plug-in for Blender as well as a full python port of ATS.

**Anna MacDonald** (b. 1975) joins DXARTS as an instructional technician. She brings 10 years of experience providing multi-media studios, shops and exhibition teams with technical and instructional support. Most recently Anna has worked for a team of archaeologists in Albania, and with at-risk youth in Baltimore's inner city as the Production Instructor for the Living Classrooms Foundation. Anna received a B.A. from Dartmouth College, an M.F.A. from the Rinehart School of Sculpture at MICA and a Fulbright to pursue Art in Berlin, Germany. Her own artistic praxis involves adapting serious play into a body of performative research. Strongly influenced by extensive immersion experiences in: Albania, the Laplands and the Solomon Islands, Anna's work has appeared in: Berlin's U-bahn, Amerika Haus, the Universität der Künste and the Baltimore Museum of Art.

**Rich MacDonald** (b. 1975) majored in computer science at Dartmouth College and received his M.F.A. for Photography and Digital Imaging at Maryland Institute College of Art. He has worked as a computer security researcher at PKI Labs, a graduate research coordinator at MICA and as a photographer for a bronze-age archaeological excavation in Albania. Rich loves wrapping his head around complex systems and tackling technological puzzles collaboratively, especially those in intersections of science and art. He has recently been exploring photographic parallels to surveying and map-making. He is interested in how such hybrid techniques can capture different models of visual perception than traditionally possible with single-viewpoint photography.

**Stacy Waters** (b. 1950) received his Ph.D. in textual studies from the University of Edinburgh, Scotland. His background in linguistics, literature, and language studies includes research, publication, and experience in instruction at both the undergraduate and graduate levels. Dr. Waters has been actively involved with computing in the arts and humanities since 1983 and has been at the University of Washington in this capacity since 1985. His recent publication concerns "Computers and Text" and he is involved with setting up a text archive.

### **DXARTS Graduate Students**

Please view the students' artistic profiles on the DXARTS website for more information.

**Zack Bent** focuses on the photograph's inherent ability to document and recall situations and his interest is in diagramming quiet and minimal moments that describe human dilemmas and mind-splitting dualities.

**Eunsu Kang** focuses on the use of telepresence and non-verbal languages as new forms of communication, as well as interactive video installations representing questions, but not necessarily pursuing answers.

**Max Keene** has a primary interest in 3D visualization, blending of interactive media and sculpture while developing custom tools and techniques for experimental media.

**Joel Kollin** is developing systems that utilize immersion and perception at extremes of sensory awareness to examine the interplay between identity, memory, surveillance, and empathy in an increasingly dissociative, media-centric world.

**Allison Kudla** uses robotics, haptics and plant biology to discover and discursively interrogate environments that are in a constant state of flux. She develops technology in her art to gain greater perspectives on the system in which she exists.

**William "Pete" Moss** is developing advanced haptic technology to compose spatialized music and virtual reality systems.

**Hiroki Nishino** is merging new media, computer science and traditional Japanese music with interactive RFID systems.

**Noel Paul** focuses on developing novel digital image-gathering technology for experimental cinema.

**Heather Raikes** focuses on hyper-dimensional new media language systems, telematic performance, physical media experience design, and technoetic embodiment.

**Tivon Rice** is currently exploring systematic image-making and communicative potential of light, form, and environment.

**Karolina Sobecka** works with interactivity, installations, video, animation, and other new and old media and her research focuses on the ways of creating meaning and creating complex dynamics between one's actions and perceptions.

**Hugo Solis** focuses on musical structure of improvised music, human computer musical interaction, and audiovisual systems. Currently, he works on the development of sonic and visual extensions for acoustic pianos and also plays with the Juum duet.

**Ewa Trebacz** is interested on experimental multimedia art. She is working on computer music and experimental stereo immersive video growing out of her decades as a violinist performing chamber music.

**Nicolas Varchausky** composes both electronic and instrumental music. His music and experimental projects try to articulate the relations between sound, space, memory, and spoken voice as musical material.

**Annie Wan** centers her work on automated performance, robotics, interactive art and architecture.

**Ryan Wolfe** designs unique sculptural systems that are at once reminiscent of and completely separate from the natural systems upon which they are based, and that engender the viewer a new awareness of the momentousness inherent in every moment. His current projects focus on exploring new ways to bring animacy and causal reciprocity to the functional objects we interact with on a daily basis.

### 3. DXARTS Pedagogy

The explosion of digital art and experimental media research arises from converging advances in information technologies, the integration of engineering and theoretical science into arts training and practice, and the rapid increase in the number of interdisciplinary digital arts and sciences practitioners now reaching a critical mass as we enter the 21st century. Although digital art on many university campuses dates back to collaborative experiments as early as the late 1950s, the advent of the “personal computer” in the 1980’s, and the emergence of the Internet in the 1990’s, gave artists and media scientists access to powerful new networked digital tools. These tools were capable of handling enormous amounts of data, and provided a new kind of versatility for artists to leverage in the invention of works of art and in the creation of arts concepts never before imagined. During the last two remarkable decades of experimentation, a new generation of hybrid (artist-engineer-scholar) emerged and blurred the lines that traditionally separated the creative arts disciplines from one another and from other areas of research and scholarship. Simultaneous to the emergence of this new type of generative artist, a unique and demanding research discipline with a sophisticated body of knowledge evolved.

The challenge before DXARTS has been to create a pedagogical structure that effectively mentors students of all levels. Thus, the DXARTS pedagogical structure is shaped by an institutionalized ethic of mentoring, a focus on teaching, and a commitment to ever evolving curricular development.

#### 3.1. DXARTS Ethic of Mentorship

With years of experience gained at UW and other institutions, the DXARTS core faculty developed substantial and useful mentoring models. However, even with excellent mentoring skill, time and energy for new and old commitments are being strengthened annually so mentoring across the board in DXARTS is uniform, analyzable and effective. Mentoring in DXARTS is everywhere and engages everyone from students, to staff and faculty.

Mentoring in DXARTS begins with junior faculty. All DXARTS Assistant Professors are given a faculty mentor as well as meet regularly with the Director. These mentoring meetings in DXARTS range from working closely together on research projects, grants, paper writing and presentation, to bi-monthly one-on-one informal coffees and lunches supported by a “mentoring fund” from the Director, to annual classroom visitation, collegial evaluations and the more formal review of the yearly annual report required by all faculty. DXARTS recently tenured its first faculty, and with a stellar committee report and a nearly unanimous faculty vote (24 in-favor, 1 abstention), it confirmed both the quality of the DXARTS candidate as well as the internal programmatic process of mentoring.

The same type of mentoring relationship between faculty and junior faculty extends to DXARTS students. All students in DXARTS are assigned a faculty advisor at the actual point of “first contact” or application to the program. Close relationships through the application process for both doctoral students and undergrads often reinforce the sense of community and investment in DXARTS, and has helped the program maintain its 100 percent acceptance rate of graduate admission offers to first round drafts. Once a graduate is in the program the faculty mentor rotates annually allowing a better education, more mindshare among the faculty cohort and doctoral students, and distributes the responsibility for mentoring the students across the most rational alignment of faculty research vectors as a doctoral students work develops throughout the course of their studies. Advisors meet with advisees at least once each quarter -- and often more frequently -- providing feedback on choice of classes, research vectors and artistic guidance. Due to the policy of opening up DXARTS classes to non-majors, faculty will often act heavily as mentors for graduate students from other departments, sitting on thesis and dissertation committees for students all across campus.

DXARTS affiliate faculty also provide a valuable mentoring route for our graduate students, whose work often crosses between disciplines. Recent examples include Ph.D. candidate Pete Moss working with Professor Blake Hannaford to develop a haptic theremin that subsequently received a major award at SIGGRAPH and Ph.D. student Allison Kudla working with Dr. Delene J. Oldenburg a Research Scientist from Biology to construct a AIA commissioned drawing machine that printed with biological materials, exhibited in December 2007 in New Orleans.

Undergraduate majors in DXARTS also are mentored both by faculty, the advising officer, graduate students, and especially in the (DXARTS 491-2-3) Thesis Sequence, which is a year long course taught in close weekly contact by senior faculty. Many students have little idea or background in a research laboratory culture until their first DXARTS, but quickly evolve and often produce research and grants that look and feel like that of graduate students at most universities.

Staff in DXARTS are also closely mentored. All staff meet bi-monthly with the Director and are asked annually to submit a “new horizon” report were they set-up research goals for their own areas in DXARTS such as advising, study abroad, and arts administration. A perfect example is an innovative pilot project funded and endorsed by the Dean, College of Arts and Science, entitled “ArtsLink” led by DXARTS’ Director of Academic Services Cynthia Caci, and Judith Clark, from the School of Art. ArtsLink lets DXARTS test the idea of global coordination of key division-wide advising services. The goal of ArtsLink is to test new methods designed to connect students to learning communities -- majors, minors, honors programs, and student professional groups, to help them develop an academic purpose and identity as soon as possible, and match that identity with learning opportunities within the College.

Finally, DXARTS’ academic structure relies on post-doctoral appointments as a way to attract emerging artists and researchers who can investigate and teach side by side with our Ph.D. students and faculty. While these positions are quite unusual in the arts they are absolutely necessary for a unit like DXARTS, where artistic creation and research naturally overlap. Also, post-doctoral appointments serve the purpose of being transitional or “spring-board” mentoring positions for our doctoral students after graduation, an opportunity for them to continue working on their research for a bit longer within DXARTS’ vibrant intellectual environment before moving on with their academic and artistic.

### 3.2. Teaching in DXARTS

Teaching in DXARTS is inextricably bound in research practice, it connects us intimately with other disciplines in ways many other arts and sciences units cannot, and it keeps the program vital by fueling the invention of many new interdisciplinary areas in which we work and pioneer. Teaching uniquely opens DXARTS up to a constant flow of campus collaborators beyond those the faculty are directly engaged in because many disciplines most advanced research is siloed in departments and only available to graduate students or majors. By designing our courses to support 50 percent of non-DXARTS graduate and undergraduate students in each 400 and 500 level class we offer, we effectively import new methods, thought processes, creative practices and tools into DXARTS, while simultaneously exporting the ingenuity and creative wealth of our program and its interdisciplinary practice to the campus’ central research core. This makes teaching in DXARTS not just a service to students but a vital transformative research practice that is a hallmark of the program. Faculty course loads parallel that in the sciences, and a standard course load of five courses per year with an average of 25 students is required of each faculty. The precise load reflects the need to invent new curriculum frequently. It also reflects the majority of courses are all graduate intensive laboratory courses with high overhead on technology development and impact, and that while doctoral students in a course might be world class programmers for instance, it does not mean they are music composers even if they have promise, so our year long sequences basically take high level polymaths from one area and train them to near expert level in another.

In its studio laboratory classes, DXARTS has pursued an “atelier” model, with each faculty member developing a dedicated laboratory environment that feeds directly from his or her own research. This ensures that new ideas, technologies and processes find their way quickly into the classroom, encouraging students to become engaged with experimental practices. In the 3D animation and modeling sequence, for instance, a recent emphasis on HD stereo cinema and lenticular photography has emerged as a direct result of Stephanie Andrews’ new work with these technologies. This work appeared quickly in our curriculum even though it is very new, advanced technically and has substantial computing and complex imaging systems to learn. The students interested in Professor Andrews work wrote and received a 250,000 dollar Student Technology Fee request to develop the first fully synchronized HD stereo video system of its kind, as well as a 400 person portable 1080P stereo theater. The students will now push the interests inside her work, gain their own experience driving research and course materials farther because of the synergy. Examples such as this abound in DXARTS.

Because of this unique practice SFSU's Professor Stephen Wilson, a recent visitor to DXARTS and celebrated historian and writer in the field, will feature projects by several faculty and students from DXARTS in his forthcoming book, as paradigmatic examples of cutting edge digital art produced within DXARTS' incubator model.

### 3.2.1. Innovative Curriculum

In terms of teaching structure DXARTS operates four major studio laboratory "sequences," in Digital Cinema (DXARTS 451-2-3), Computer Music (DXARTS 461-2-3), 3D Space (DXARTS 441-2-3) and Mechatronic Art (DXARTS 471-2-3). Around 25 students (both undergraduates and graduates) are registered each year per sequence, with 50 percent of the places made available for non-majors. Other DXARTS classes include numerous graduate level extensions of these sequences (e.g. DXARTS 565), undergraduate research seminars (DXARTS 400) and thesis classes (DXARTS 491-2-3), and graduate seminar (DXARTS 500) and research methods classes (DXARTS 505). The focus and specialization which year-long sequences have placed DXARTS and the UW at the forefront of digital arts pedagogy, with faculty often giving master classes and serving as advisors to related academic programs around the world.

DXARTS B.F.A. students take a series of three 200-level DXARTS classes in the process of applying to the major. DXARTS 200 is a large lecture class providing a survey of the history of digital art practice and theory. Around 150 students, predominantly sophomores, from across the university register for this class, at the end of which they may apply to take DXARTS 201, a studio laboratory class with around 25 available places. Students in DXARTS 201 have the opportunity to apply to become DXARTS B.F.A. students, with around 15-20 students selected each year and consequently taking another studio class, DXARTS 202 as the actual gateway to the major.

After DXARTS 200, student coursework dovetails with the five areas of research central to the DXARTS mission. The year long course sequences are focused on acculturating students to the DXARTS artist scholar practice. The courses in the five areas of research are outlined below.

#### **Visual Synthesis**

One can imagine that that a studio arts tradition might prepare students for the creation of images and objects, but is woefully inadequate in the art, science and practice of creating something as simple as a "moment." The architecture of time as it is studied and applied in DXARTS addresses the evolution of this dimension in visual synthesis. Our three-course sequence (DXARTS 451-2-3) in Digital Video introduces students to the skills and concepts used in high-end digital video production. The sequence includes exposure to industry standard equipment, terminology, and digital video production skills in experimental arts context such as field production and electronic image gathering, field and studio lighting, and non-linear editing. It also includes significant time spent involved with digital audio, compositing, and digital effects, all within an alternative cinematic or experimental arts context. The sequence further advances students into interactive video installation, live video-synthesis and processing, hybrid video robotic and telematic interaction, non-standard form factor camera fabrication and experimental electronics for digital video. The 3-Space computer modeling and animation sequence of classes (DXARTS 441-2-3) introduces students to sophisticated 3D graphics software tools to explore object modeling, environment construction, surface texturing, and image rendering. It leads student to pursue further investigation into orchestrating movement, including deformation, dynamics, and rigging. Also the courses cover techniques such as particle systems, simulation, and scripting. Finally, the sequence prepares them realize highly ambitious art projects with topics ranging from virtual reality, interactive 3D, networked environments, and rapid prototyping.

#### **Aural Synthesis**

DXARTS is one of the pioneering centers for computer music and many important contributions have been made to this field by our faculty and doctoral students. Since the inception of our new curriculum a wholly new teaching and research approach has been implemented for this area, opening the domain of aural experience into an Art medium, which interfaces, synergistically with all of our other areas of focus. Four primary areas intersect to define our approach to aural synthesis: acoustics and psychoacoustics, algorithmic composition, 3D audio, and real-time processing and sensing.

Our Digital Sound sequence of classes (DXARTS 461-2-3) gives our students a strong foundation in each

of these areas, preparing them to work on their own artistic and research projects. More advanced courses such as Sound in Space (DXARTS 467) and Spectral Modeling (DXARTS 465) focus on particular areas of Aural Synthesis, preparing our students to do high-level scientific research. Also, three research groups have been formed to do advanced research in this field: the ATS group, focused on spectral modeling ([www.dxarts.washington.edu/ats](http://www.dxarts.washington.edu/ats)), the ultrasound group, focused on the use ultrasound beams in performance and sound art, and the real-time processing and sensing group, focused on the development of software and hardware tools for live performance. The development of our own software and hardware has enormously facilitated the exchange of data and tools between artists and researchers, which is crucial for the expansion of this area of artistic production. Post-doctoral research associates have also provided much of the recent development of our advanced software tools which DXARTS has made these public and open-source resulting in their use by other artists and researchers internationally. Special facilities such as our 3D Audio Lab play a key role in the production of new Aural Synthesis works, allowing for modeling and experimentation of new acoustic experiences which can be extrapolated to Art works in any of our areas of focus.

### **Algorithmic Processes**

A major component of the core DXARTS courses where computer programming is a focus is the design and use of algorithmic programming techniques and their application to art practice. The computer music series (DXARTS 461-3) has historically relied on the strength of programming languages such as LISP to teach students the development and control of large scale musical structures while at the same time allowing the artist to focus on the smallest sonic material at the same time. LISP, CommonLisp Music (CLM) and Common Music are all powerful environments for the student to synthesize, create and process musical sound. From this background, courses in advanced techniques for algorithmic instrumental and computer composition have also been presented as a special topic for more advanced students. Research from within the department has also led to the expansion of other programming languages (most notably the SuperCollider sound synthesis language, the core language currently explored in the DXARTS sound series) in an effort to bring the power of algorithmic processes from more mature languages to the next generation of programming tools. The mechatronic art sequence (DXARTS 471-3) involves a substantial concentration upon art systems as distinct from art objects, making the use of algorithmic programming structures vitally important to the work students produce. Students' program interactive installation projects using combinations of software (Java, C, Python) and hardware (microcontrollers, logic gates, opamps, etc.), seeking to engage audiences within dynamic responsive environments.

### **Sensing and Control Systems**

DXARTS has pioneered a number of new courses and research tangents in the area of mechatronic art. Historically this is an unusual focus for a digital art program, yet it emphasizes a highly integrated, interdisciplinary approach to work at the intersection of art, engineering, electronics and computer science. Mechatronic art takes a "systems" approach to building work that can quantify input (microphones to process voice, cameras to perceive behavior, sensors to read movement, position, orientation, etc.), algorithmically process this input, and then generatively re-organize itself via appropriate outputs (mechanical actuation, movement, networked communication, audio-video playback, etc.) The results are art systems that are interactive, responsive, have memory and are capable of exhibiting dynamic emergent properties.

### **Telematics**

The explosion of networked social interaction technologies (internet, email, text messaging, virtual communities) over the last decade has dramatically extended the scope and scale of the potential sites in which we can situate art. DXARTS is especially interested in the possibilities that such technologies open up for building artworks that exceed the bounds of what can be presented in a single space. Telematics – the act of communication over distance – permits the development of projects that viscerally interface audiences with other systems (physical, biological and man-made), thus allowing them to engage with structures different to themselves. For instance, using telematics we can give audiences control of a remote environment that they would never normally be able to inhabit (biological system, nanoscale structure, virtual space, etc.) The infrastructure put in place at the Fremont Laboratories is predicated upon providing appropriate resources for our students to explore this rich area of practice further.

### 3.2.2. Course Matrix

With the creation of a completely new curriculum in digital and experimental arts, DXARTS designed a curricular “course matrix” that is organized by sections into unified research genre’s and structured around a logical and uniform numerical system that allows pedagogy to be directly managed in a logical continuum from course design to course addition and removal. The course matrix reduces the often ad hoc curricular approaches seen in other programs and where numbers are simply applied where one is not used, versus providing a clear pedagogical logic to be applied and followed to all courses so they can be quantified and considered within the rubric of the program. The matrix legend follows the simple rules of all courses that are double zero’s are introductory non-laboratory seminars, single digit’s such 05’ are research writing and scholarly courses, all course in the teen’s are critical, historical, theoretical and epistemological, courses in the 20’s are web-space, courses in the 30’s are computational and algorithmic, courses in the 40’s are synthetic 3D space such as virtual reality, courses in the 50’s are video, cinema and moving image, courses in the 60’s are audio and sound synthesis based, courses in the 70’s are sensing, mechatronic and robotics, courses in the 80’s are integrated performance practice, courses in the 90’s are individual, topical or one of a kind research courses such as undergraduate thesis.

At the upper-division, all series in DXARTS require an application. This process includes our majors as well as non-majors. This laborious process allows instructors the ability to select a highly diverse “team” of classroom participants through a series of questions and prompts that elicit important information from the students. Faculty can understand students’ learning objectives and match those with the intended outcomes for the course.

The following are current courses on the books that have been taught and forthcoming courses that are being implemented:

#### Lower Division

- DXARTS 198/A Digital Improvisation
- DXARTS 198/B Digital Expression through Self-Portrait
- DXARTS 200 Digital Media History, Theory and Practice
- DXARTS 201 Fundamentals of Digital and Experimental Art I
- DXARTS 202 Fundamentals of Digital and Experimental Art II

#### Upper Division

- DXARTS 330 PIXELS (cross-listed CSE)
- DXARTS 400 Undergraduate Research Studio
- DXARTS 411 Applications of Digital Technologies to Humanities Research (cross-listed HUM)
- DXARTS 430 Algorithmic Process/Programming for Artists
- DXARTS 440 Fundamentals of Interactive 3 Space
- DXARTS 441 3 Space 1 | Computer Modeling and Environments
- DXARTS 442 3 Space 2 | Computer Motion and Advanced Techniques
- DXARTS 443 3 Space 3 | Special Topics in Stereo Space
- DXARTS 450 Introduction to Digital Video
- DXARTS 451 Experiments in Digital Video I The Architecture of Time
- DXARTS 452 Experiments in Digital Video II Video Art and Video Installation
- DXARTS 453 Experiments in Digital Video III Interactive Video Systems
- DXARTS 460 Digital Sound
- DXARTS 461 Digital Sound Synthesis (Cross-listed with Music)
- DXARTS 462 Digital Sound Processing (Cross-listed with Music)
- DXARTS 463 Advanced Digital Sound Synthesis and Processing (Cross-listed with Music)
- DXARTS 470 Sensing and Control Systems for Digital Arts
- DXARTS 471 Mechatronic Art, Design and Fabrication I
- DXARTS 472 Mechatronic Art, Design and Fabrication II
- DXARTS 473 Mechatronic Art, Design and Fabrication III
- DXARTS 490 Special Topics
- DXARTS 490/A Interactive Computer Music with Super Collider Programming Language

- DXARTS 490/B Augmented Reality
- DXARTS 491 Senior Thesis | Ideation
- DXARTS 492 Senior Thesis | Prototyping and Iteration
- DXARTS 493 Senior Thesis | Exhibition and Documentation
- DXARTS 499 Independent Research
- DXARTS 500 Research Studio
- DXARTS 505 Research Techniques in Digital Arts
- DXARTS 517 Applied Psychology of Audio and Visual Perception
- DXARTS 528 Real-time Digital Image Signal Processing
- DXARTS 552 Advanced Topics Digital Video
- DXARTS 565 Spectral Modeling of Sound
- DXARTS 567 Sound in Space
- DXARTS 569 Real-time Digital Audio Signal Processing
- DXARTS 595 Advanced HD Stereo Immersive Video
- DXARTS 598 Advanced Special Topics
- DXARTS 600 Independent Study
- DXARTS 800 Dissertation Credit

### **Forthcoming Upper Division Courses**

- DXARTS 412 Digital Media Theory
- DXARTS 420 eMedia Design
- DXARTS 432 Database and Interface Art I
- DXARTS 434 Database and Interface Art II
- DXARTS 436 Information Arts
- DXARTS 518 Telepistemology
- DXARTS 523 Spatial Imaging
- DXARTS 579 Telematic Studio
- DXARTS 582 Interactive Performance Systems

### **3.3. DXARTS Graduate and Undergraduate Programs**

The goal of doctoral education in DXARTS is to create equal opportunities for artists to discover and document new knowledge and expertise at the most advanced levels higher education can offer. Unlike the Master of Fine Arts degree, which is the usual two-year professional degree of Art Practice, the Ph.D. is a generative research oriented degree requiring a substantial commitment to graduate-level study and reflection. The Ph.D. degree signifies that an individual is qualified to investigate fundamental problems in the nature and practice of Digital Arts and Experimental Media, pursue original creative and technical research in the field, and contribute to the development of knowledge and its consequences in society and culture. Students who successfully complete the doctoral program are expected to possess substantive knowledge and expertise in an area of the field, and in advanced methods of inquiry that are suited to the field along with the demonstrated ability to conduct independent original inquiry.

Faculty members from two colleges (Arts and Sciences, and Engineering) form the Core Faculty for the Ph.D. in DXARTS. This group acts as the primary faculty overseeing the development and teaching of the graduate curriculum and the supervision of doctoral students in the DXARTS program. More than 45 new courses specific to the DXARTS and graduate program have been designed and taught in the past five years, while others have been selected, and or modified from those already existing in the participating units and across the University. The program has shown enormous innovation in its teaching and learning paradigms, which is especially appropriate for an emerging interdisciplinary field. The program is highly selective with regard to admission and demanding in terms of the achievements expected of students. Thus far the Ph.D. program has a nearly 100 percent retention rate, with only one graduate student withdrawing for health reasons.

The spirit of undergraduate education in DXARTS is similar to the Ph.D. program, except unlike the many other B.F.A. degrees -- which is the initial professional studio art degree -- the DXARTS B.F.A. is primarily a pre-graduate, generative research oriented degree. It signifies that an individual is professionally qualified to proceed further toward graduate studies in the digital arts and sciences and

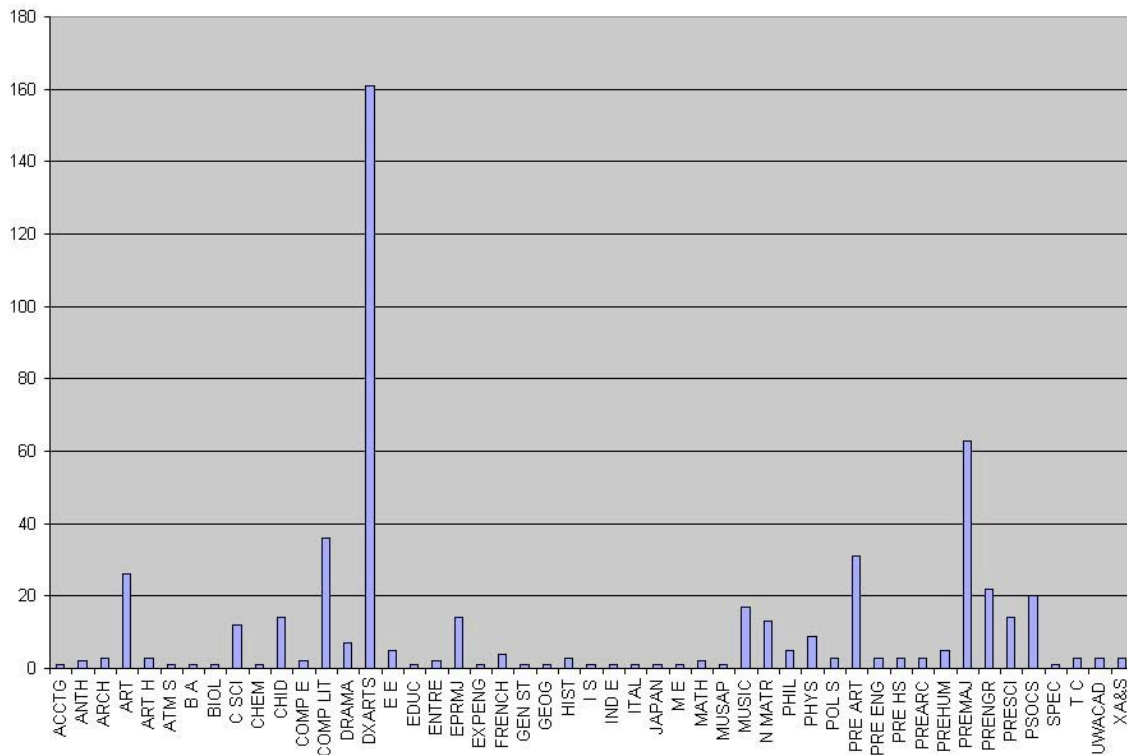


investigate fundamental problems in the area. They are prepared to pursue original creative and technical research in the field and contribute to the growing body of knowledge in the field.

Though the involvement of non-majors in the DXARTS research mission has been mentioned, it is important to highlight the role that non-majors play in creating an interdisciplinary community at DXARTS. Non-majors (undergraduates and graduates from other colleges, schools and departments) make up a significant component of our course enrollment. Traditionally, a minimum of 50 percent of the seats in our 400-level courses are designated for non-majors and competition for these is significant. It is not unusual to have a first-quarter freshman pre-major and an advanced graduate student in anthropology to be enrolled in one of the year-long explorations of Digital Video, Digital Sound, 3D Space or Mechatronics. Including non-majors in the DXARTS courses is not a function of lack of demand for the DXARTS undergraduate major or graduate program. DXARTS commits money and space to including non-majors because the DXARTS community must be interdisciplinary to continue to flourish. Therefore, as the graph below demonstrates, DXARTS consciously seeks to have, if not 50 percent, a large number of total class space filled by non-majors.

Enrollment management for these courses requires extensive participation of the faculty and the undergraduate advisor. The use of the campus Catalyst Systems for online application to each DXARTS course is required. At the upper-division, all series in DXARTS require an application. This process includes our majors as well as non-majors. This laborious process allows instructors the ability to select a highly diverse “team” of classroom participants through a series of questions and prompts that elicit important information from the students. Faculty can understand students’ learning objectives and match those with the intended outcomes for the course.

**Graph 1: Example of Students in DXARTS Sequences by Major, 2005-06**



DXARTS students can choose to contribute to DXARTS’ intellectual project in the following research areas:

- Experimental HD Digital Cinema
- Stereo Imaging and Holography

- Virtual Reality and Stereo Immersive Environments
- 3D Modeling and Animation
- Computer Music Composition
- Ambisonic and Holophonic Sound
- Digital Signal Processing
- Sound Design and Sound Art
- Computer Programming and Algorithmic Art
- Database and Interface Art
- Haptics and Human Computer Interaction
- Interactive Media
- Mechatronic and Robotic Art
- Sensing and Control Systems
- Interactive Installation and Performance Systems
- Real-time Digital Video Synthesis, Graphics, and Effects
- Hybrid Gaming Systems
- Telepresence and Telematics
- Interactive Architecture
- Hybrid Performance and Dance Technology
- Biomedica and Genomic Art
- Digital Arts Intellectual Property
- Custom Software Engineering

The degree requirements for graduate students, undergraduate students, and the honors students are structured to create courageous, inquisitive researchers prepared to take a leadership role in an emerging interdisciplinary field. The “nuts and bolts” of the program structure are discussed in the next section.

### 3.3.1. Doctor of Philosophy Digital and Experimental Arts Program Structure

The intent of the Ph.D. program is to identify, recruit and support the most outstanding individuals pioneering the most advanced digital and experimental arts research being undertaken in the world. While entering doctoral students are required to have developed a significant body of work, as well as established substantive careers, the inherently interdisciplinary curriculum in DXARTS implicitly requires all students to diversify their artistic practice across a minimum of two major content areas in DXARTS (visual synthesis, aural synthesis, algorithmic processes, sensing and control systems, mechatronics and telematics) or pioneer completely new ones. Their course of study also asks they extensively compliment their research with relevant upper-division coursework selected from related fields such as computer science, engineering, genomics, drama, dance, bio-engineering, biology, and neuroscience.

#### **Program and Admission Requirements**

Admission to the DXARTS doctoral program is once year. Applications are normally submitted during the winter for subsequent fall admission. Applicants to the Ph.D. program in DXARTS have obtained a Master’s Degree or its equivalent and provide their curriculum vitae, letters of reference, teaching philosophy, examples of syllabi and student work (if they have been instructors), and an electronic art portfolio of exceptional artistic depth, rigor and ingenuity. In addition, they submit as a part of their application a brief “Statement of Purpose” which frames the nature of their research goals and interests, as well as (and most importantly) a hypothetical Project Proposal -- sited 50-100 years in the future -- which includes a substantial and detailed digital, experimental arts project proposal, such as might be submitted to a museum or an arts commissioning panel in the future. The purpose of this proposal is multivalent. The proposal helps demonstrate the level of intellectual independence and comprehensive understanding achieved by the applicant at the time of application to the program. The proposal also highlights the level of academic maturity and technical sophistication, as well as provides a small glimpse at the scale of synthetic thought process, how they might bring their personal vision to fruition, and the body of knowledge they will impact both in terms of creative practice and as well in the program. This proposal includes a full description of the project with many options available for presentation such as diagrams, computer generated models, animation, sound design, movies, timelines, collaborative partners (hypothetical or actual), and a detailed proposed budget.

Other standard application materials include Graduate Admissions Application, transcripts of all previous college work, and TOEFL scores for international students. All students are expected to show competence

in computing, substantial technology literacy, and skill and imagination across multiple areas of interest. Successful candidates have most commonly come from arts and sciences disciplines, have a documented history of creating experimental and digital art forms, and are highly synthetic in their thinking and approach.

### **Funding and Support**

Doctoral students play a major role in the research and educational missions of DXARTS. Once admitted a DXARTS doctoral student receives an initial three-year funding package that includes; tuition, fees, 24/7 studio and laboratory access, a new laptop, and a monthly stipend. Full funding clearly separates DXARTS from any similar program or those currently being developed in the field. All funded students have appointments as Teaching Assistants, Staff Assistants, or Research Assistants. During their time as funded Ph.D. students many have multiple assignments either assisting in the instruction of courses taught by faculty members, as lead instructors teaching in some of our undergraduate courses, as lab assistants helping to run and maintain the laboratories and studios, as research assistants, working with faculty and guest researcher/artists on major collaborative projects, and as research fellows pursuing their own projects and working on projects in collaboration with others. The continuation of funding each year is contingent on availability of funds, as well as progress of the doctoral student toward the goals set forward by the program and in accordance with their advisor. A modest number of doctoral students continue to receive funding for all five years depending on their impact in the program, institution and their field. Graduate advisors in DXARTS are selected annually and are rotated every autumn quarter. While students maintain continuity with their committee, DXARTS has designed rotating advisors so students and faculty have the greatest mind-share during their tenure and this arrangement helps synergize both the research and the scope of program faster.

### **Timeline**

Each candidate's background, interests and skill sets make the timeline to degree completion slightly different, but the maximum time allowed for a student to move through their Ph.D. is five years. There are three phases to the program and the conferral of the Doctor of Philosophy in Digital and Experimental Arts.

- **Phase One**

Advanced coursework in an interdisciplinary core curriculum chosen from DXARTS and partner departments. This is normally a one to two-year period of study depending on a student's previous training and accomplishments. Students devise a course of study in this phase with advice and approval of their primary faculty advisor. Doctoral students are required to have proficiency in a minimum of two interdisciplinary fields of research, and required courses may be waived if the student can demonstrate equivalent knowledge of the subject material.

- **Phase Two**

Further advanced coursework with increasing focus on a small number of specific areas accompanied by significant semi-independent research and creative work. This is normally a one to two-year period of continued research, study and artistic production which begins after successfully passing the Qualifying Critique. Phase Two culminates with the General Examination, typically at the end of the student's third year.

- **Phase Three**

Proposal, Production, and Completion of the Final Doctoral Project. This phase is a work of substantial scale, artistic and technical depth, and originality. Phase Three also includes the completion of the dissertation. The DXARTS dissertation is unique in that it comprises five interconnected "instruments" that form the formal dissertation. The first instrument is the familiar written treatise that is a rigorous scholarly document covering the historical, critical and theoretical issues surrounding the creation of the work. The second instrument is complete technical documentation of the project including custom software, shop drawings, circuit board design, mechanicals, scores, and film treatments, etc. The third instrument is part of CODEXA and will in the future evolve into a shared common scoring, notation, and archiving language

for digital arts. The fourth instrument is exhaustive documentation of the installed, performed or exhibited final Doctoral Project. This could include time-lapse installation video, television and radio interviews, CCTV footage of people interacting with the work, professionally mastered 3-D CD's or DVD audio recordings, etc. The fifth and final instrument is the "synopsis" which includes a layman's abstract of the work, as well as a critical reflection on the work as "to what was most successful, and least successful," and further speculative projection or "roadmap" that looks at the research as a whole, what might be over the horizon if the work is continued, what are the next steps in the evolution of the line of inquiry, and what are the bodies of knowledge that it is best prepared to advance.

### **Qualifying Critique Structure**

The Qualifying Examination and Critique for DXARTS is critically important as it is required to determine if the student continues forward in the program to candidate status or is released. The structure for the exam and critique is comprised of three interconnected examination fields, The Written Examination, The Research Tool Examination, and the oral Qualifying Critique. The Written portion of the Qualifying Examination is two short field essays designed in consultation with the exam committee. The Research Tool Examination covers the evolution of the student's technical knowledge and virtuosity, as well as the successful integration of new tools since entering the program. Following the completion of the Written and Research Tools portion of the Qualifying Examination, the student prepares for and undertakes the Oral Qualifying Critique. In this examination the student frames a serious and compelling oral exposition and presentation of their past research, outlines their areas of virtuosity and core competence, and begins a broad discussion of their proposed dissertation research.

#### Qualifying Examination Structure

- **Written Examination**

The Written portion of the Qualifying Examination is two short field essays (1000 words) designed in consultation with the students' exam committee. The field essays are not designed to ask students to provide the answers to the question, or function as exhaustive stand-alone scholarly texts, but instead serve to directly provoke the speculative questions the student and committee will discuss in the oral critique section of the exam. The Committee defines and prepares two exam fields no earlier than two weeks before the Qualifying Examination and Critique.

The two written fields are generally configured as follows:

Field One focuses on the history and theory of the candidate's mediums of engagement.

Field Two focuses on the importance of their particular arts practice providing a brief comparative perspective between personal arts philosophy and a broader reflection of current invention, innovation, and experimentation in their areas of engagement. This essay punctuates -- from the point of view of the candidate -- what is enduring, potentially transformative and historical about the work they are preparing to undertake.

- **Research Tools**

The Research Tool Examination briefly covers the evolution of the student's technical knowledge and virtuosity since entering the program. It also looks directly at the appetite for invention, technological risk-taking, and successful integration and adaptation of new tools in their arts practice since entering the program.

- **The Qualifying Critique Structure**

The Qualifying Critique is a preliminary oral examination conducted by the student's graduate committee, and constituted by the student in conjunction with the program's Directors. While all components of the Qualifying exams should be taken seriously, the Qualifying Critique is the defining moment in the graduate student's advancement to Ph.D. candidacy. The substance of the oral exam depends on the student's particular research and teaching interests, and the

student has an important role in determining exam areas. In delineating those areas in collaboration with her or his committee, the student is in many ways defining or inventing her or his new intellectual and professional arenas. This self-definition is carried out in the previous two related stages (written and research tools) of preparation for the examination. The Qualifying Critique committee then reviews the student's progress to that point and then confers with the student in a 90-minute discussion. 45 minutes are covered by the exposition, and the rest by rigorous open discussion, allowing the student the opportunity to communicate directly and openly with the committee, and for the committee to assess the student preparedness to advance toward dissertation work. The substance of the meeting is both retrospective and prospective. It includes discussion both of the student's work at DXARTS to that point and of conceptualizations and plans for future directions. The latter should be taken seriously as a preliminary view into the student's dissertation research.

### **Credit and Degree Requirements**

- Prior to the General Examination which concludes Phase Two of the program, six quarters of full-time (minimum of 10 credits per quarter) study must be completed (It should be noted that this is the minimum requirement. Some students may require longer preparation before being approved to take the General Examination). Part-time (fewer than 10 credits) quarters may be added together to equal full-time quarters, but three out of four consecutive quarters must be full-time. None of the credits counted toward this requirement may be in DXARTS 800 (Final Doctoral Project) credits.
- Complete 60 credits of DXARTS approved courses (not including the DXARTS 800 credits). At least 30 of the credits earned must be at the 500 level. At least 30 must be in graded 400 and 500 level courses.
- Maintain a minimum 3.0 GPA in DXARTS courses. At the discretion of the Program Director in consultation with DXARTS faculty students who fall below a 3.0 GPA may be allowed a probationary period during which they must show improvement or be terminated from the program.
- The student must pass the General Exam. Registration as a graduate student is required during the quarter the exam is taken.
- The student must complete a Final Project that is a substantial and original contribution in both artistic and technical domains. The student must take at least 27 credits of DXARTS 800 (Final Doctoral Project) over a period of at least three quarters before taking the Final Doctoral Exam.
- The student must pass the two-part Final Exam. Registration as a doctoral student is required during the quarter the exam is taken.

### **General Examination Structure**

The General Examination for Doctoral Candidacy is administered after the student has passed the Qualifying Critique, usually by the end of the student's third year. The purpose of this examination is:

- To determine whether the student has acquired the necessary background in at least two major areas of Digital and Experimental Arts as well as background appropriate for his/her proposed research.
- To determine whether the student is able to draw on this background to continue to progress in their research and creative work in a primarily independent manner.
- To determine whether the proposed area of research and creative work have the potential of leading to an original and substantial work of art which explores new aesthetic domains based on the invention of new and advanced technical means.

The General Examination has two components:

The Application of Knowledge and Technique, and the Oral Examination

The Application of Knowledge and Technique part of the examination is both dialectical (written

argumentation) and dialogical (a practicum) and takes place over a ten-day period. The student is given written examination questions, as well as a difficult project based problem to accomplish within their primary areas of focus. The student is assigned the exam project at nine am of the first day and must have completed it by five pm of the last day. If the project requires materials, those will be provided at the time the assignment is received at the beginning of the exam period. If the student's Supervisory Committee has decided that the Application of Knowledge and Technique part of the exam was completed successfully, the student will take the Oral Exam no less than one and no more than two weeks afterwards. This part of the General Exam is approximately one and a half hours. The student may be further questioned about their written and application components of the exam as well as a broad range of technical and creative subjects pertinent to Digital Arts.

The structure of the DXARTS General Examination is further augmented by a novel application of the University GSR system. The Graduate School Representative (GSR) typically is a faculty member from the Graduate School present during a general examination to confirm disciplinary rigor and due-diligence is observed throughout the examination process. Instead of adding these individuals at the end, DXARTS graduate students are encouraged to seek them out early on in their tenure and build a working relationship with them. These faculty, are often from fields far outside of an arts programs such as Bio-Engineering, Plant Biology, and Neuroscience. The general exam then has a member that is both outside the program, but has deep knowledge of the interdisciplinary fields of the doctoral student, and often allows the GSR in the examination to become much more active and less passive -- as most GSR's typically are silent -- making a far more rigorous exam and a better process. A number of GSR's have asked to join the core faculty of DXARTS after participating with our doctoral students, and the faculty and student in our general examinations.

### 3.3.2. Bachelor of Fine Arts in Digital and Experimental Arts Program Structure

The goal of undergraduate education in Digital Arts and Experimental Media is to create opportunities for artists to discover and document new knowledge and expertise at the most advanced levels higher education can offer to emerging artists. Unlike the many other B.F.A. degrees, which are the initial professional studio art degree, this B.F.A. is primarily a pre-graduate, research-oriented degree. While entering students may initially identify themselves as purely visual, aural, or some other kind of artist, our inherently interdisciplinary curriculum requires all students to diversify their artistic practice across the five major content areas (visual synthesis, aural synthesis, algorithmic processes, sensing and control systems, mechatronics and telematics) as well as complement their study with relevant upper-division coursework selected from related fields (computer science, music, drama, dance, engineering, art, architecture, cinema studies, etc.) Because 50 percent of all seats in DXARTS courses are reserved for non-majors, students in the program benefit from the perspectives and viewpoints brought to the learning environment by students representing other disciplines.

The first introduction to DXARTS a campus undergraduate has typically comes from a DXARTS event, exhibition, or our large gateway course DXARTS 200. More than 150 DXARTS pre-majors from across campus take this course. DXARTS 200 opens up the discipline from multiple angles, critically, historically and in terms of disciplinary rigor and arts practice. Major international artists, scholars and scientists are scheduled to speak for the course, as well as weekly discussion sections and collaborative research projects with Doctoral TA's help provide multiple environments for students to engage the practice. Bi-annual campus orientations on DXARTS help students get further acquainted with the goals, disciplinary focus and intensity of the program. After an innovative set of pre-requisites including Math, Physics, Art and Music History, as well as Computer Science, our majors are prepared to apply for the major, and have also been prepared for as many as 15 other majors beyond DXARTS if they are not accepted, or they may chose to be a double or triple major in another field along with DXARTS. This broad preparation required for DXARTS is very unusual for any B.F.A. program.

Also unique is that the undergraduates take only three courses at the 200 level in DXARTS before being pushed up to graduate level course work where they will do the majority of their degree and research at the 400 and 500 level. Along with the focus on "original" research, they are also in contact with 50 percent non-majors in each course, allowing them to integrate research practices, methodologies and thought processes outside the arts into their art practice. They collaborate with these non-majors on research in other fields, reinforcing the best practice of high-level multidisciplinary. The inclusion of the 50 percent non-majors in DXARTS also allows for those not admitted to the major to effectively have

nearly full access to DXARTS courses, making it a very successful and equitable system of cross-pollination.

Student performance is monitored and evaluated through all phases of the undergraduate program. Each student involved in the application process is reviewed and evaluated by the DXARTS faculty members and graduate teaching assistants most closely working with these students in DXARTS 200 and 201. Upon admission to the major, students are required to produce a course of study that will inform their trajectory through the major, including both DXARTS coursework as well as selected coursework from the broader University curriculum. Each year in the program, students apply to a minimum of two of the year-long DXARTS series in which they intend to enroll, giving them the opportunity to reflect upon and articulate their personal learning objectives. Along with the primary faculty advisor, the student will work closely with the Assistant Director of Academic Services to make appropriate course selections and to ensure satisfactory degree progress. DXARTS doctoral students, who are often enrolled in the same series as the undergraduates, also provide informal mentoring.

Each year, except the thesis year, the DXARTS major also enrolls in DXARTS 400, a high-level research seminar designed for the DXARTS undergraduate cohort. This course provides each major intimate contact with the most pressing critical, theoretical and experiential aspects of each other work during their tenure in DXARTS. In the final phase of the Program the student enrolls in a year long thesis seminar DXARTS 491-493 that moves them successfully through the process of ideation, working prototypes, and full scale implementation. The implementation phase involves heavy on input from the students formal Thesis Advisor – DXARTS Core Faculty – who guides the student through the remainder of the program, including the public exhibition of their thesis work. The DXARTS faculty announces at the end of Junior year our selection for the “Outstanding Undergraduate of the Year” and presents a 1000 dollar research award to be used the following year on the recipient’s thesis project.

The department is currently developing and defining learning goals for undergraduate majors in this new field. Program goals include the following:

- To harness the creative interactions of students through multidisciplinary classrooms, laboratories, and studios and serve the campus as an incubator for rigorous research, educational excellence, innovative artistic production, community and industry collaboration.
- To challenge basic assumptions about art and art practice, dissolve boundaries between disciplines in order to invigorate and intensify innovation, and question distinctions such as notions of art object and apparatus, theatrical performance and experiment, artist as author and audience as passive viewer.
- To develop personal research methods and innovative new technical means that will help students prepare for more advanced investigation in emerging, artistic, philosophical and scientific issues in digital and experimental arts.
- To fulfill the State’s burgeoning need for quality undergraduate education in the digital arts and allow students at the University of Washington to attain new levels of rigorous original research in this emerging field
- To prepare students for leadership roles in pioneering the new artistic and technical advances of the 21st century.

Additionally, our undergraduates learn the following technical skills:

- HD Digital Cinema Production
- Digital Video and Audio Editing
- Stereo 3D Imaging, Virtual Reality and Holography
- Computer Music Composition
- Sound Design and Sound Art
- Website Design and Programming
- 3D Modeling and Animation
- Motion Graphics and Special Effects
- User Interface Design
- Human Computer Interaction
- Interactive Media Production
- Mechatronics and Robotics

- Sensing and Control Systems
- Electronic Stage and Set Design
- Experimental Installation Art
- Interactive Architecture
- Interactive Dance and Performance Systems
- Computer Programming and Custom Software Design

DXARTS uses a range of methods to assess student learning. Some of these methods include:

- Classroom assessment, various methods
- Course evaluations
- Applicants' work in DXARTS 200 and 201 carefully reviewed and evaluated before admission
- Student self-assessment: students required to articulate their learning objectives at key points in the program
- Capstone experience: a year long thesis seminar that moves students successfully through the process of ideation, working prototypes, full-scale implementation, and public exhibition of their theses

### **Program and Admission Requirements**

Admission to DXARTS is once a year. Applications are normally submitted during a student's sophomore year, and made during the winter quarter for admission in spring. A minimum 2.50 GPA guarantees consideration, but the GPA of accepted applicants is normally considerably higher. All applicants, regardless of background and proposed course of study, will be expected to show a significant level motivation, creativity, strong interdisciplinary instincts, solid computing skills, and general technology literacy. Students must enroll in DXARTS 200 autumn quarter. Based on performance in DXARTS 200, approximately 25-30 students are selected to continue in DXARTS 201 winter quarter. Students enrolled in DXARTS 201 are eligible to submit an application and supplemental materials to be considered for admission spring quarter. Admission is highly competitive, and approximately 15 students are accepted into the major annually. Supplemental materials for admission include: an electronic portfolio, a statement of interest in the program, and a proposed course-of-study plan.

Students must complete the following prior to application:

- CSE 142
- PHYS 114 or PHYS 121
- MUSIC 120
- ART H 203
- Mathematics proficiency through the pre-calculus level is required. Proficiency may be demonstrated by completion of MATH 120 or equivalent, a minimum score of 68 percent on the UW Advanced Mathematics placement test, a minimum score of 2 on the mathematics AP exam, or the completion of a college-level calculus course.

### **Major Requirements**

In addition to the courses required for admission as described above, major requirements include 64-74 credits of DXARTS courses, as follows:

- DXARTS 202 (5 credits)
- Three quarters of DXARTS 400 (6 credits total)
- DXARTS 412 (3 credits)
- Completion of two of the following four DXARTS core sequences (30 credits): DXARTS 441, DXARTS 442, DXARTS 443 (3D Motion and Graphics); DXARTS 451, DXARTS 452, DXARTS 453 (Video); DXARTS 461, DXARTS 462, DXARTS 463 (Sound); DXARTS 471, DXARTS 472, DXARTS 473 (Mechatronics).
- Completion of a third core sequence as listed above or one of the following fundamentals courses dealing with a third content area (5 to 15 credits): DXARTS 440, DXARTS 450, DXARTS 460, or DXARTS 470.
- Senior thesis in the form of 15 credits of DXARTS 491, DXARTS 492, and DXARTS 493, including the



completion and exhibition of a BFA thesis project that is a significant and original contribution both aesthetically and technically.

- 20-30 credits in additional DXARTS courses, or courses from a list of approved electives in other areas, to bring total major credits to 94.
- A minimum 2.0 grade in all DXARTS courses counted toward the major. A cumulative GPA of 2.50 in all DXARTS courses and approved electives.

### **Undergraduate Honors Program**

An honors option within DXARTS was proposed and approved in Autumn 2006. For high-achieving students seeking a rigorous and enhanced educational experience within an already challenging and demanding undergraduate degree, the honors option in DXARTS provides these individuals with the opportunity for more intensive writing within the curriculum, a public forum for presentation of their research, and required participation in graduate-level seminars and studios.

In order to be invited to participate in DXARTS honors, a student must have:

- Minimum 3.3 UW Cumulative GPA
- Minimum 3.6 GPA in a DXARTS courses (minimum 13 credits)
- Students will graduate with Departmental Distinction in DXARTS by completing the following requirements:
  - Minimum UW Cumulative GPA of 3.3
  - Minimum DXARTS GPA of 3.6
  - DXARTS 493 - Senior Thesis (5 credits) with a written thesis requirement and a public presentation of research (at the Undergraduate Research Symposium, at the DXARTS Thesis Colloquium, or a faculty-approved committee).
  - DXARTS 505 - Research Techniques in Digital Arts (3 credits) or any 500-level DXARTS studio course
- Elective method of completing additional Honors work (minimum 5 credits) to be selected from the following options:
  - Ad Hoc Honors Course in DXARTS
  - Approved UW Honors Course (H A&S 350, 396, 397, 398)
  - Approved Foreign Study
  - Approved special projects, pedagogy seminar, research, presentation at a national or international conference, or selection to a juried exhibition or concert with a presentation component (i.e. gallery lecture,) through DXARTS 490 or DXARTS 499

### **3.3.3. Programmatic Outcomes**

In line with DXARTS' mission, the outcome of both the DXARTS Ph.D. and B.F.A. program has already begun to produce an expert body of technically literate and artistically sophisticated digital arts pioneers who can advance the state of research, practice, and education in this emerging field. Their work and teaching will expand the body of knowledge in this important new discipline and reinforce its integral relationship to the arena of creative and scholarly practice throughout the world. The program provides a strong interdisciplinary educational experience that draws on the resources of the entire university and the laboratory provided by the larger network of digital arts research underway internationally. The program emphasizes the educational values of artistic innovation, interdisciplinarity, and intellectual and technical leadership. The program has seen its graduates becoming highly sought after and prominent artists in a growing international community of researchers, practitioners and educators who will create new technologies and digitally-realized art forms that have never before been heard, seen, or experienced.

### **Recent Programmatic Highlights**

- Of the first 17 DXARTS Ph.D. students that have arrived since fall 2004, seven doctoral students have completed their qualifying exams, and three (with two more scheduled for Winter 2007) have finished their general examinations and have begun their dissertations. Dr. Gerald Pollack the GSR present from UW Bioengineering for the first DXARTS general examination stated it was "unequivocally the most rigorous general examination he had ever witnessed."

- The four full rounds of Ph.D. applicant selections brought our total doctoral cohort up to 17 students. DXARTS has had a 100 percent success rate of graduate students accepting offers of admission. Three of those accepted have been ladder rank faculty at other universities. With multiple new Ph.D. programs at other universities now following the DXARTS model, and more coming online, the acceptance numbers can be considered the best in the country, as we are attracting the number one students internationally. We typically receive more than 50 qualified applications annually for the Doctoral program.
- The DXARTS doctoral cohort is highly integrated, international, and a phenomenally diverse group of women and men from China, Korean, Japan, England, Poland, Mexico, New York, Chicago, San Diego, San Francisco, and Seattle. Their primary backgrounds as artists are poly-mathematic and range from architecture, music, filmmaking and dance, to industrial design and engineering. We are committed to recruiting and supporting women and minority candidates, and feel extremely lucky that we have achieved strong gender parity in our doctoral cohort that is steady at 50/50 female to male ratio.
- Four doctoral students have received prestigious awards this year alone for innovative work in the field, including; an \$25,000 MTV Incubator Award for a new broadband video series, an invitation to exhibit in the exclusive Venice Architecture Biennale, the sharing of a SIGGRAPH award in haptic's with UW's Mechanical Engineering graduates, and a \$30,000 award to develop an artificially intelligent art work for the celebrated Unknown Territories project located in the United Kingdom.
- The first group of DXARTS Graduating Seniors exhibited their work in June 2006 at Consolidated Works Gallery in Seattle. *The Stranger Magazine* reviewed the innovative show and critics claimed it was the single best student art show in the region bar none, and that it was "a bullet to the head of the Henry's M.F.A. show shot from a particle accelerator." For those applying, DXARTS undergraduates received 100 percent acceptance into graduate school including, NYU, Columbia, UCLA, School of the Art Institute of Chicago, and University of Illinois Chicago.
- As of Winter 2007 DXARTS has 45 undergraduate B.F.A. students as the program gradually builds towards full capacity of 50. DXARTS undergraduate -- sophomore Jared Friend -- was awarded a prestigious 2006 Mary Gates Research Fellowship, to develop a feature film titled *Only Story*. This was DXARTS third Mary Gates Grant, the most of any arts unit on campus.
- Freshman applicants are asked to indicate their area of academic interest as part of the University application process. For the incoming class of 2006, the demand for DXARTS as expressed as a ratio of student interest to the number of departmental faculty ranked higher (at 32:1) than that for Art, Business and Computer Science (each at 9:1), three of the largest and most popular undergraduate degree options available at the UW.

## 4. DXARTS Successes

DXARTS measures its success in the strength of its community and its commitment to its interdisciplinary and inclusive research mission. However, DXARTS faculty and graduate students have had high levels of external acknowledgement of their work.

### 4.1. Faculty Successes

Unlike the majority of other digital art Ph.D. programs, DXARTS faculty are practicing artists, working to explore and expand the digital arts paradigm and inspire students by example. Despite the relatively small number of faculty at DXARTS, an unbelievably broad spectrum of backgrounds, practices and expertise are covered. These backgrounds ensure the regular presence of DXARTS-sponsored projects at major galleries, museums, festivals, concerts and conferences throughout the world, resulting in regular grants, awards, publications, catalogs and reviews. DXARTS provides a vital support environment that gives faculty a platform from which to engage in these innovative practices through the availability of unrivalled resources, rare interdisciplinary dialog and significant support and funding. Collaboration is considered essential for the realization of the many highly ambitious projects taken on by DXARTS faculty, meaning it is common for collaborations to occur between faculty, as well as with other departments and experts from other institutions. Faculty positions at DXARTS are consequently highly sought-after, a fact that is evidenced by many of our doctoral cohort having previously held faculty positions elsewhere. DXARTS faculty regularly win grants, commissions and awards that provide opportunities for their own research as well as support the program and enabling the involvement of doctoral students.

A small list of recent faculty successes show a very active, dynamic, civically minded and important body of practitioners.

#### Stephanie Andrews

- Co-authored the successful \$250K DXARTS Student Technology Fee grant, *The Immersive Cinematic 3D Creativity Toolkit*. The proposal has three major categories - the Digital Stereographic Cinema kit, the Touch Environment Sensing Tools, and the Portable Immersive Theater (2006)
- Co-designed, installed, tested and opened a new DXARTS 3D computer classroom studio lab in Raitt Hall. This facility features multi-media workstations for up to 25 students for instructor guided hands-on learning during class time, as well as off-hour access for those enrolled in courses using the room. Several new classes, as well as pre-existing ones were housed in this classroom over the past year, expanding the DXARTS academic service to the University (2006).
- Presentation of current research and past work to National Film Board of Canada Montreal headquarters (2005).
- Developed and taught new series of DXARTS courses in 3D modeling now part of the central core of the program (2005).
- UW Faculty Field Tour Participant (2005)

#### Paul Berger

- Published photomontage works in *Light and Lens, Photography in the Digital Age*, ed. Robert Hirsh, Focal Press, ISBN 978-0-240-80855-0; and *Nash Editions: Photography and the Art of Digital Printing*, ed. Garrett White, New Riders ISBN 0-321-31630-4 (2007)
- Visiting Artist public lecture; University of Oregon, Eugene, OR (2006)
- Published photomontage work in *Criticizing Photographs, An Introduction to Understanding Images*, 4<sup>th</sup> Edition, Terry Barrett, McGraw-Hill, ISBN 0-07-297743-4 (2005)
- "Persistence of Vision"; Artist's Lecture, 2005 Society for Photographic Education National Conference, Portland, OR. (Invitational speaker 2005)
- Juror, Works on Paper Selection Panel, King County Public Art Collection, Seattle, WA (2004)
- Artist's Lecture, on the one-person exhibition "Warp and Weft," Blue Sky Gallery, Portland, OR (2004)
- Guest Speaker, Robert C. May Photography Endowment Lecture Series, University of Kentucky,

- Lexington, KY (2004)
- Artist's Lecture on the retrospective exhibition "Paul Berger: 1973-2003," Museum of Contemporary Photography, Chicago, IL (2003)

#### Shawn Brixey

- Chair, Faculty Search Committees for DXARTS positions (2002-2007)
- Published historical analysis of his art and research work in *From Technological to Virtual Art*, by Dr. Frank Popper, MIT Press, Cambridge, Massachusetts, ISBN: 026216230X (2007)
- Keynote Speaker, "From Simulation to Emulation: New Frontiers in Telematic Arts," MIT Press and Leonardo New Media Futures, College Art Association Conference, Boston (2006)
- Information Systems Taskforce, Provost Appointed Committee, 10 Year Comprehensive Technology Plan, University of Washington, Seattle, Washington (2006)
- Faculty Search Committee Member, Industrial Design, University of Washington, Seattle, Washington (2006)
- Lecturer, Tufts University for the New England Chapter of the IEEE Society and received the Society's certificate for "Outstanding Contribution" (2006).
- Academic Technology Advisory Council (ATAC), Provost Appointed Standing Committee, Oversight of Campus Technology, University of Washington, Seattle, Washington (2006)
- National Science Foundation IGERT Lecturer at UC Santa Barbara. MAT Program, College of Engineering and the College of Arts and Letters students and faculty (2005)
- Published historical analysis of his art and research work in *Museums and Civic Dialogue*, Case Studies from Animating Democracy, Americans for the Arts, Pam Korza, Washington, D.C. ISBN: 13:978-1-879903-37-1 (2005)
- Distinguished Visiting Lecturer in Visualization and Architecture at Texas AM (2005).
- Keynote Speaker at the Artmedia XI International Conference, in Salerno Italy. ARTMEDIA released its Conference Publication, "Phenomenology of New Technology Arts," from ARTMEDIA Press, Universita di Salerno, Italy (2005)
- World Design Challenge, Winner: Editors Choice Award, *Popular Science Magazine*, New York, New York, Co-Investigators Bret Battey, Ian Ingram (2004)
- Berkeley Art Museum, University of California Berkeley, Berkeley, California, "Gene(sis): Contemporary Art Explores Human Genomics," Chimera Obscura, with Richard Rinehart, Commissioned Telerobotic Installation; on-line catalog and CD-ROM (2003)
- Rockefeller Foundation Fellowship, New York, New York, past fellow include Bill Viola and Gary Hill (2003)
- Broadcast interview and analysis of his research work in *Secrets of the Sequence*, Award Winning PBS Television Program 108, Chimera Obscura, Cronkite/Ward, June, Washington, D.C. (2002)

#### James Coupe

- Exhibited *(re)collector*, A major public art installation, Commissioned for Enter\_Unknown Territories in Cambridge (2007)
- Exhibited The Difference Engine commissioned for the Edinburgh Festival, Scotland. UK Guardian Newspaper's Pick of the Festival (2005)
- Guest lecturer at Tufts University, Boston. IEEE award for Outstanding Contribution to the Field. (with Shawn Brixey) 2006
- Published chapter in *The State of the Real: Aesthetics in the Digital Age*, (Tauris Press). "Art, Representation and Responsibility, Towards a System Aesthetic" <http://www.palgrave-usa.com/catalog/product.aspx?isbn=1845110773>
- Invited to present paper "From Simulation to Emulation" (with Shawn Brixey) for the Leonard Education Forum, College Arts Association Conference, "From simulation to emulation" (with Shawn). Paper to be published in *Leonardo Journal* next year. <http://mitpress2.mit.edu/e-journals/Leonardo/isast/events/caa06.html>
- Invited speaker at Art as Research Telematic Symposium, University of Maine

#### Blake Hannaford

- Named IEEE Fellow for Contributions to Haptic Interfaces and Telerobotic Systems (2006)
- Guest Faculty Service Award, Department of Electrical Engineering, "In recognition for excellent

service to the department and the community through work in Faculty Recruiting, Educational Administration, and Curriculum Development” (2005)

- Published “The Blue Dragon, a System for Measuring the Kinematics and the Dynamics of Minimally Invasive Surgical Tools In Vivo,” one of 10 finalists for Wegbreit Best Manipulation Paper Award from among 700 papers presented at IEEE International Conference on Robotics and Automation, Arlington VA (2003)
- “Mechanisms for Surgery via the Internet,” Invited Keynote Lecture, International Mechanical Engineering Conference and Exhibition, Seattle WA (2002)
- “Surgery via the Internet,” Distinguished Lecture, Computer Science Department, Columbia University, New York, NY (2002)
- “Surgical Telerobotics,” Invited Seminar, Samsung Advanced Institute of Technology (SAIT), Seoul Korea (2002)
- Summer School in Surgical Robotics, Montpellier France (2002)
- Invited Plenary Talk, International Conference on Control, Automation, and Systems, Bangkok, Thailand (2002)
- Invited Seminar, Korean Advanced Institute of Technology (KAIST), Daejeon Korea (2002)

### Richard Karpen

- Appointed Divisional Dean for Research and Infrastructure, College of Arts and Sciences, first artist to hold title of Dean at The University of Washington (2006)
- Released critically acclaimed retrospective CD *Sol/Tutti* on Centaur Record Label (2006)
- Computer-enhances performance, Vitoria, Spain (2006)
- Recipient Donald E. Peterson Fellowship for Excellence
- Developed performer-wearable bow-arm accelerometer and control software (2006)
- Developed LED/Photo-resistor trombone sensing device and control software (2004)
- Chair of Graduate School Review Committee for a Ph.D. program proposal from the College of Architecture and Urban Planning (2003).
- International Jury Member for *Euphonie d'Or* Prize, Bourges, France (2004).

### Juan Pampín

- Nada for viola and live electronics, commissioned by violist Melia Watras for her CD *Prestidigitation* (2006)
- Catch 22 goes online telematic sound installation, commissioned by the Ingenuity Cleveland Arts and Technology Festival (2006)
- Reviewer for the EURASIP Journal on Audio, Speech, and Music Processing (2006).
- Catch 22 goes underground (2005) site-specific sound installation, commissioned by the city of Buenos Aires, Dirección General de Museos (2005)
- Tropos site-specific sound installation, commissioned by the Agencia Española de Cooperación Internacional (AECI) for the CCEBA Buenos Aires (2005)
- Featured artist of the Anfibios television show on Ciudad Abierta, public cable TV channel of the city of Buenos Aires. This half-hour show included an interview and broadcasting of works, including special covering of the Tropos sound installation. The show was broadcasted during prime time in October, and repeated a numerous times during the same year (2005)
- UW representative at the Beyond Productivity invitational conference at University of Illinois Urbana-Champaign (2004).
- Featured composer of the Sismo 2004 Electroacoustic Music Biennial which took place in August 2004 in Mexico City, organized by Universidad Autónoma de Mexico (UNAM). Activities included a week-long composition seminar, and the performance of Metal Hurlant.
- Recipient of a 2003 UW Royalty Research Fund grant for surround-sound recording research.
- Análisis Espectral y Síntesis con ATS, week-long workshop taught in collaboration with Prof. Pablo Di Liscia at Universidad Nacional de Quilmes, Buenos Aires, Argentina, and at Escuela Universitaria de Música, Montevideo, Uruguay (2003).
- Composition With New Technologies, lecture at Universidad Nacional de Córdoba, Argentina (2003).

## 4.2. Careers and Successful Students

Our highly unique environment and disciplinary rigor have led both doctoral and undergraduate students to create lasting interdisciplinary work and thinking. DXARTS students are truly excited by the broad exposure they receive to such a variety of disciplines, colleagues, problems, concepts, methodologies, and technologies. They are also emboldened by the fundamental nature of questions raised in DXARTS by the artists and scientists working here collectively in these fields, and many of these scholars' revolutionary research here at UW literally helped form the interface between disciplines that they are themselves now working. Our students generally comment that in comparison to other recently formed digital art Ph.D. programs elsewhere, that DXARTS is by far the most advanced, complex, inventive, supportive, coherent, well equipped, arts focused and intense. Three current DXARTS doctoral students previously held ladder rank at other universities and took leaves of absence to enter the DXARTS Ph.D. program because of the "pioneering faculty, the community of artistic invention, the culture of fearlessness, and that the goals were implicitly not just about technology, but about true discovery and making enduring contributions that edify and document what it means to be human now." Most students state they been searching for years for such a program, one that melded a truly generative practice of experimental arts, with advanced technology, the physical and biological sciences, performance systems and the body. Teaching in the program has helped reinforce the new ideas here as well as allow students to generate their research and creative identity inside the program by designing courses they get to teach and building their own research teams.

DXARTS doctoral students have been extremely successful in receiving awards and commissions, producing high profile exhibitions and performances, as well as writing peer reviewed papers and book chapters. While the program has only been in existence for five years, and our first doctoral students are just now finishing their dissertations, careers for them will be very rich and diverse, possibly including: University Faculty and Researchers; University Program Directors; Experimental Artists; Film Directors; Stereo 3D Imaging and Virtual Reality Experts and Researchers; Computer Music Composers; Sound Designers and Engineers; 3D Modeling and Animation for Gaming; Film Editors, Motion Graphics and Special Effects Artists; User Interface and Human Computer Interaction Designers; Mechatronics and Robotics Developers; Experimental Installation Artists; Interactive Architecture Designers; Choreographers and Interactive Dance and Performance Systems Developers; and Computer Programmers and Custom Software Designers.

A snapshot of activity taken just between 2005-2007 shows our students received an amazing 13 commissions, including new works for the Venice Architecture Biennale, The International Symposium of Electronic Art, Unknown Territories UK, American Institute of Architecture, ElectroFringe, and SIGGRAPH. Awards and distinctions are in the dozens and include the International Computer Music Conference, Artists Trust, and SIGGRAPH. Equally impressive were student exhibitions and performances including Istanbul, Turkey, Lisbon Portugal, Paris, France, Warsaw and Breslau, Poland, Newcastle and Perth, Australia, Boston, Massachusetts, Santiago, Chile, Zurich, Switzerland, and New York, New York. Broadcasts and Television performances include Polish National Television, Radio Amsterdam, Argentinean Television, and Austrian Television. Papers, oral presentations at meetings and posters sessions include ACM, SIGGRAPH, ICMC, ISEA, Spark, Leonardo, and many more. Our doctoral students are already securing excellent first jobs and interviews, and none have taken longer to earn their degrees than five years, which is an excellent benchmark by national standards.

While the students work closely with faculty and mentors, our real goal is to produce remarkable artistic and intellectual breakthroughs that originate with the students themselves, not as offshoots of established faculty research programs. For example, Ph.D. student James Coupe's 2007 commissioned Arts Council England project *(re)collector* is a large scale public art installation that involves ten custom-built camera units positioned around Cambridge, England. The camera units are designed with onboard artificially intelligent systems and are free to gaze, pan, tilt, zoom in and capture specific vistas, points of view, and reference shots, each of which operates as a grammatical and syntactical location or phrase in an algorithmically generated film. The cameras are programmed to recognize the gesture and phrasing of particular human behaviors at certain time of day that occur within their vista, and to record these moments in which such behaviors take place. At the end of each day, the footage captured by each independent camera's instincts are then automatically analyzed and reorganized in real time via Cambridge University's super-computer into a complete film, composed from the actions that take place in each location. The films consist of seemingly epic sequences of humble daily activity that flow together to form the seeds of a familiar narrative. The familiarity of the film structure is based both upon

the cameras AI systems having master narrative templates from classic films such as *Vertigo*, *Alphaville* and *Blow Up*, that they use to frame and shoot from, and then the super-computer having a formally composed arc of editing and composition that it applies to essentially found footage.

Finally, the film generated by the *(re)collector* system are then played back in the city center on a large projection screen, broadcast back into the city and starring the general public as its protagonists and antagonists. The simultaneous perspective of the city that the cameras provide that no one human could perceive permits the system to exert an omni-directorial control over the fragmentary daily stories that touch people's lives during their everyday activities. The insertion of the screen into the city itself allows people to watch themselves woven into a narrative larger than their life at the locations they were simply filmed, and to watch themselves making decisions and understanding how those decisions fit into a collective whole. At the same time, the *(re)collector* system is making decisions of its own -- what to include, what to cut, what to linger upon, what to juxtapose. The work occupies public space, attempting to reveal to us aspects of ourselves that we cannot perceive without the project's omniscient perspective.

Further highlights of novel and exciting interdisciplinary research originating with our doctoral students include:

#### Joshua Parmenter

- Performances of *III Decrescendo* a new commission for computer realized sound at Cadence, Northwestern University, Evanston Illinois, and *II. Accelerando*, a new Concerto for Double Bass and Computer Realized Sound in Seattle and Berlin, Germany.
- Received new commission from Contemporaenea of Copenhagen for female voice and double bass with live electronics. Commission was performed by double bassist Kristjan Orri Sigurliefsson and the Slide Show Secret Phoenix, and presented in both Seattle and San Diego, CA.
- Continued software development of a new suite of spectral processing unit generators for the SuperCollider synthesis program. As well as a real-time interface and structure for SuperCollider programming (ProcMod and ProcEvents), and Interfaces from both CommonMusic and SuperCollider for generating GUIDO musical mark-up files for algorithmic composition.

#### Noel Paul

- Received a prestigious \$25,000 MTV Incubator Award for new alternative reality video work - AUTOCH.
- Screened his critically acclaimed film *Wait for Me* at the Port Townsend Film Festival and many other film festivals nationally.
- Conceived and taught the University's first Summer Film Feature Production Course DXARTS 456. The course focused on the writing, pre-production, filming and editing of a feature film in just eight weeks by student beginners.

#### Eunsu Kang

- Exhibited her new work SeoNang at the exhibition, *MOVING IMAGE @ CAVE*, CAVE gallery, NY, also at the *Interactive Playground: Sight Unseen*, Beverly Arts Center, Chicago, USA
- Was an invited artist for *A Tribute to a True Pioneer, Nam June Paik: Post Video Garden*, EMAP (Ewha Women's University), Seoul, Korea
- Was included in *Young Korean Artists 45: Interviews*, Publisher: DaVinci Gift, Seoul, Korea

#### Hiroki Nishino

- Performed his new electronic music composition *Self-Portrait of My Life* at SONIC Channels 2006 in Zurich, Switzerland.
- Developed and implemented a professional level web based software application for a DXARTS wide render farm initiative, allowing for all computers not being used to have

processor cycle time brought online for massive internal research computing and rendering projects.

#### Annie On Ni Wan

- Invited Artist, WakeUp@MetaVilla, 10th Venice Architecture Biennale, Venice, Italy
- Invited Artist, mobile projection project *Phenakistoscape* at ZeroOne in San Jose, California for ISEA 2006, The International Society for Electronic Arts. ISEA is the international organization for interdisciplinary academic discourse and exchange among organizations and individuals working with art, science and emerging technologies
- Invited to Curator, Online locative media gallery for the influential Leonardo Electronic Almanac (LEA), who serves the international arts community by promoting and documenting work at the intersection of the arts, sciences, and technology, and by encouraging and stimulating collaboration between artists, scientists, and technologists.
- Developed and performed at ACM at the University of California Santa Barbara the world premiere of a new RFID augmented dance performance *Tre Marie* in collaboration with DXARTS doctoral student Hiroki Nishino, and M.F.A. students in the UW Dance Program. This project has been touring nationally.

#### Allison Kudla

- Commissioned Artist, American Institute of Architects, *Capacity for Urban Eden and Human Error*, DeCours Public Art Exhibition, New Orleans, LA, USA
- Exhibited her new plant biology project *Oxalis 1 Luminosity* at the DXARTS Fall Concert, Meany Hall, and as a juried new work in digital media at the University's Jake Lawrence Gallery, curated by Western Bridge, Seattle, USA

#### Ewa Trezbac

- Had three international performances of her influential work for harpsichord and electronics, *Chordochromies* for Polish Radio -- broadcast, Wroclaw (Breslau), Poland -- Festival "Musica Polonica Nova" and, at Lublin, Poland -- Filharmonia Hall, Goska Isphording, on harpsichord.
- She had two performances of her *Spinning Zone* project for percussion trio and electronics done live at the Klangspuren Festival, in Schwaz, Austria, performed by The Next Step Ensemble, percussion group, and for broadcast, by Radio Amsterdam FM -- program by Patricia Werner Leanse.
- She had multiple performances of her *Ephemeræ* project for wind instruments and electronics done live at the Klangspuren Festival, in Schwaz, Austria, director Kasper de Roo. World premiere, as well as broadcast on ORF Radio and Television, Austria
- Her *Minotaur* for electronics, surround sound and French Horn was performed by Henryk Kalinski in Warsaw, Poland at the 48<sup>th</sup> Annual International Contemporary Music Festival *Warsaw Autumn*. The performance was done in the unusual location of the High Voltage Hall -- at the National Science Museum. It was broadcast live in (Dolby 5.1) stereo by Polish National Radio and Television.



## 5. DXARTS Infrastructure

DXARTS infrastructure can be split into the physical infrastructure that allows the research community to work and the institutional infrastructure that creates opportunities for creativity.

### 5.1. Physical Infrastructure | Laboratories, Facilities, and Equipment

DXARTS is widely considered as having some of the finest laboratories, classrooms and facilities of any digital or experimental arts program in the world. The DXARTS home is located in the historic neo-gothic building -- Raitt Hall -- on the Quad at the center of the University of Washington's campus. DXARTS also maintains extensive off-campus research facilities located in a warehouse in the Fremont neighborhood of Seattle. DXARTS places extremely high technological demands on labs and facilities involved in the kind of vanguard, forward looking pursuits in digital arts and research that are the primary foci of the program. By creating unparalleled facilities we have been able to enable the participating faculty and students to create innovative and meaningful advances in the state of the digital and experimental arts. DXARTS offers many advanced resources unique to the university and extremely rare outside of it, including optics, wet biology, holography, electronics fabrication, circuit board design, large scale CNC machining, full 3D audio, large scale animation render farm and computing grid, HD stereo immersive digital video production and reproduction facilities, and much more. Thanks to these advanced tools, not only are DXARTS faculty able to do pioneering research, but DXARTS students are exposed to and have the opportunity to work with cutting edge systems that are substantially ahead of the curve.

#### 5.1.1. Raitt Hall Labs and Facilities

The Raitt Hall facilities are open and available for use 24 hours a day via an in-house secure ID card system. DXARTS' Raitt Hall is approximately 11,000 square feet and comprised of multiple offices, a kitchen, a seminar room, two large integrated computing labs, a large digital audio recording laboratory/classroom, a small audio isolation booth, a large digital video laboratory/classroom, a shared 75 seat 1080p HD cinema theater, a medium sized 3-D stereo immersion laboratory/classroom, a medium sized grad student office and computing lab, an advanced optics, holography, microscopy, biology, electronics and micro-machining research lab, a dedicated server room, five advanced HD/SD turnkey post production video, animation and audio suites, a hot storage and media library room for daily checkout of equipment and films, and numerous other smaller rooms. The Fremont Laboratory, shown later in this section, handles the majority of film and sound stage production work, as well as all fabrication and large scale prototyping. Most of the computers in the laboratories and classrooms of Raitt Hall are new Apple Quad Core workstations, outfitted with a broad array of specialized professional digital video, audio, stereo imaging, haptics and animation peripherals as well as extensive commercial and custom software, media creation and manipulation tools. Studio software standards such as Final Cut Pro, Photoshop, After Effects, Avid Xpress, Digital Performer, Max/MSP, Rhino, Maya, and other software are ubiquitous. Using the program's wide array of facilities, faculty, students and clients from across campus, have created many award winning exhibitions, films, experimental videos, computer animations, virtual reality systems, robotic, mechatronic, and telepresent works, as well as extensive computer music and 3-D audio works.

#### **Digital Arts Open Lab (Raitt 129)**

The Open Lab provides approximately 15 new Apple Quad Core workstations all with PC software capabilities via Parallels Desktop, 3 Windows XP workstations, several high-end photo and slide scanners, and large format printers. The Open Lab is open to CARTAH clients and DXARTS students, the majority of whom have 24/7 access to the facility. Each quarter, dozens of CARTAH clients use the Open Lab facilities for training and in-service on CARTAH equipment, to engage in their arts, sciences and humanities research projects, as well as to design and build new digitally based courses and curriculum under CARTAH guidance. The Open Lab serves as a classroom for some of these experimental new courses such as DXARTS/HUM 411 ~ Application of Digital Technologies to Humanities Research. Furthermore, this versatile space provides primary on-campus research facilities for all students in the Digital Sound Synthesis series of course (DXARTS 461-3). The Open Lab also houses two private AVID HD digital video post-production suites that are outfitted with a wide array of tools to integrate audio,

motion capture, and haptic data associated with HD video production.

### **3-D Digital Audio Research Lab (Raitt 117)**

The 3-D Audio Research Facility is one of only a handful of studios in the entire world that offers a full-time 3-D ambisonic playback rig (See [http://www.york.ac.uk/inst/mustech/3d\\_audio/ambis2.htm](http://www.york.ac.uk/inst/mustech/3d_audio/ambis2.htm)). In this facility, dedicated Apple Quad Core workstations running custom software (developed at DXARTS) drives a dozen precisely-placed loudspeakers arrayed around the floor and ceiling. Using this system, students can easily create, re-create, and/or manipulate true three-dimensional sound-fields. The Audio Research Facility is not limited to 3-D sound reproduction but also provides stellar state-of-the-art stereo and traditional surround sound recording and playback. In addition, the Audio Research Facility provides a large-format video projection system that has been acoustically isolated from the listening space, making this space ideal for final production work on soundtracks and other video-synchronized sound works. It also boasts a separate dual windowed isolation booth, designed with irregular geometry and triple internal layer dampened and baffled walls.

### **Incubator 3Space Animation Studio (Raitt 105)**

The Incubator is one of the newest facilities in DXARTS. It is the teaching classroom and studio facility for the 3 Space Computer Modeling Sequence of classes (DXARTS 441-3). In addition to 20 Apple Quad Core workstations running Maya and Blender (3D modeling software) and large-format video and audio reproduction facilities. The Incubator also houses multiple Phantom Omni haptic touch systems, and two state-of-the-art 3D stereo video projector systems, shutter goggles, infrared synchronizers and a dedicated Windows workstation driving them. All of the machines in 105, as well as others in DXARTS, are available for use as a single large scale render farm via custom DXARTS designed web-based Apple platform software.

### **Digital Video Classroom (Raitt 205)**

The Digital Video Classroom is the primary location of lab work and pedagogy for the Experiments in Digital Video Sequence (DXARTS 451-3). The classroom contains five high-end Apple Quad Core workstations outfitted for our HD/SD video production pipeline. Each workstation has dual 23" Apple LCD Cinema Displays, dedicated professional DVCAM deck recorders, and professional SMPTE "C" phosphor HD/CRT monitors. Each workstation is loaded with a wide array specialized software for non-linear HD video editing, motion graphics, and compositing. The classroom maintains a 5500 lumen, 16 billion color digital cinema projector, a high performance perforated screen designed to boost the image contrast by 500 percent, and a 5.1 sound system. It houses our road-case ready theatrical presentation breakout rack that includes Motu, Outlaw, and other peripherals, as well as serial controllable DVD players, and a professional Grass Valley 12 channel SD/HD/Computer Analogue/Digital A/V production Switcher and Mixer.

### **Production Studios**

Within Raitt Hall, DXARTS has five professional production studios. Each studio is designed with irregular geometry and triple internal layer dampened and baffled walls, which produce exceptional sound isolation. The studios all maintain high-end Apple Quad Core workstations outfitted for our HD/SD digital video production pipeline. Each workstation has dual 23" Apple LCD Cinema Displays, dedicated professional DVCAM deck recorders, and professional HD/LCD monitors. Each workstation is loaded with a wide array specialized software for non-linear HD video editing, motion graphics, and compositing. The studio's each boast tuned sub-woofers and 5.1 sound systems. The studios also contain a dizzying array of supplemental hardware and software tools, providing high-end audio and video monitoring, haptic control, as well as digitization and capture facilities for virtually all audio and video formats.

### **Network, Server System and Computer Infrastructure**

The computer infrastructure at DXARTS is currently integrated via a central server system. The server implementation we currently work with a new 50TB Apple XSAN. Using this system, we can address the constant need for flexible technology infrastructure in our discipline, as well as provide a secure and manageable system that can be heavily scaled as our department continues to grow. Our existing server system consists of one Apple Intel Xserve File-server -- the workhorse of our current implementation -- which handles all of our user level file space and accounts, render farm and cluster, web space, and digital archive. The server is supported by two Apple Mac Pro meta-data controllers, which manage data on the 50 Terabytes of storage spread among our eight Apple XRAIDS. The system currently supports

approximately 100 in-house client machines ranging from iMac G5s to Mac Pros to Dell Windows XP PCs as well as supporting off campus access to file-space for faculty, staff and grad students. 30 of the Raitt Hall lab machines (scaling soon to 80) are setup in such a way as that when not in use they support computation for our custom render farm, cluster and grid computing solutions. The render farm is temporarily constrained by the number of Maya 3D graphic rendering software licenses we have, and will be expanded to over 1000 machines in support more generic forms of cluster and grid computation within our current model. The XSAN implementation itself allows for adding more servers (up to 1000) and more file space (up to a Petabyte) to support expanding needs.

## **Equipment**

Aside from the fixed room equipment, DXARTS maintains a large-scale, high-volume, custom in-house checkout and reservation system for a wide range of standard portable and one of a kind digital arts research equipment. Equipment reservation and checkout at DXARTS is a critical feature for both the coursework of DXARTS courses, and in the facilitation of independent DXARTS student and faculty and CARTAH client research. All equipment not reserved for the current quarter's courses is available in a larger checkout pool to CARTAH clients and is available for repeat 24 hour periods, weekend checkouts or in some cases longer term checkout for special projects and exhibitions. DXARTS owns 25 Production level digital video cameras including four HD cameras, four 24P cameras with matte boxes and prime lenses, as well as other format cameras that including input devices for our unique stereo HD video capture system. DXARTS has several smaller HD cameras as well as a sizable fleet of prosumer and production level DV cams, and various other visual research devices, including high speed programmable scientific research cameras, field monitors, DV decks, Russian dolly, Steadi-cam, underwater camera systems, Kinoflo and Arri professional lighting kits, and high resolution digital still cameras. DXARTS maintains 15 high lumen data projectors including a new Christie 2K digital cinema 3D projector. On the audio end, DXARTS has several high-end microphones and recording devices, the pinnacle of which are the ambisonic microphones and DEVA multitrack recording device, as well as a highly configurable sound performance rig, scalable from small rooms to large halls such as Meany Hall. DXARTS also has a variety of more esoteric and specialty equipment, including optical laboratory devices, stereo microscopes, biological lab equipment, interactive dance and performance system hardware and software, blue tooth and RFID configurable motion capture systems, 2007 marks the first year DXARTS will begin the management of STF Joint Program Equipment (JPE). This unique contractual arrangement allows for example a non-technical unit – such as Dance -- to jointly apply with DXARTS to receive advanced technology STF funding based heavily on the substantial DXARTS technical research expertise and our support infrastructure. In return for the management of JPE, DXARTS receives 50 percent of the time on every piece of equipment in the JPE. This arrangement encourages deep collaboration with DXARTS and JPE units, and also provides an increasingly wide body of research equipment in DXARTS in every possible field. Finally, every year DXARTS assesses its technological development vector and utilizes internal and external funding, such as the STF, Avid, Apple partnerships and others to build upon this growing database of equipment. We continue to reach further and further for advanced technology not available through other means on campus, and to provide for the students and faculty the frontiers of what it means to be a cutting-edge research institution.

### **5.1.2. Raitt Hall Construction and Laboratories**

The historical landmark building Raitt Hall on the University's Quad is the permanent home of DXARTS. The scale of research enterprise and the comprehensive nature of the new degree granting program required that substantial brick and mortar space be allocated as a part of its start-up process. The design of its state-of-the-art labs, classrooms and offices required substantial time and direct faculty commitment. Numerous iterative design rounds with architects failed to produce the necessary space design that embodied the creative work-flow, as well as the internal logic and spirit of DXARTS. The faculty in the end drew up the final design plans in-house and the Directors accelerated and streamlined the construction process by joining the construction management team. A complete gutting of the interior of the building found many superstructural and infrastructure problems in the historic building delaying the construction numerous times. Reclaimed and renewable materials are used throughout DXARTS reinforcing conscious stewardship of environmental resources.



**Raitt Hall Main Campus Laboratory, Classrooms and Facilities**



**Raitt Hall Main Campus Demolition**



**Raitt Hall Main Campus Demolition**



**Raitt Hall Main Campus Construction and Build-out**



**Raitt Hall Main Campus Construction**



## **Raitt Hall Main Campus Completion**

### **5.1.3. Fremont Laboratory**

DXARTS operates a 5,500 square foot laboratory-warehouse facility with 24/7 access in the Fremont area of Seattle. The laboratory-warehouse is multi-purpose: it functions as massive flexible studio and workshop space for the Ph.D. students and faculty, and it includes a bookable in-situ exhibition, sound stage and performance space -- The Observatory -- available to DXARTS faculty, grads and undergraduate students. Fremont also hosts the DXARTS mechatronics classroom-laboratory, from where the Mechatronics Sequence of classes (DXARTS 471-3) is taught. The laboratory-warehouse is extremely well resourced with an OSHA certified precision full ferrous metal CNC machine shop that includes manual milling machines, mini, bench and full-sized CNC milling machines, a 10' X 8' CNC auto-torch height controlled plasma cutter, pneumatic controlled horizontal bandsaw, chopsaw, drill presses, vertical metal bandsaw, grinders, MIG, TIG and inverter welding. The woodshop features an industrial table saw and sled, an 8' X 4' vertical panel saw, dual compound miter saw with 16 foot table, vertical band saw, multi-speed drill presses with jig tables, and stationary sanders all supported by an integrated dust collection system. The mechatronics classroom incorporates a sophisticated electronics laboratory where students are taught to build art projects that use circuit elements, mechanics and microcontrollers. The mechatronics lab has data projectors, teaching stations, large grounded work tables, parts storage, and five G5 iMac workstations that run electronic prototyping software such as Wiring (for Arduino) and software development platforms such as Processing. It also boasts flexible PC board printing as well as other many other support peripherals. Fremont also maintains DXARTS' Stereo HD Immersive Video test site where various stereo HD capture and playback video systems, as well as lenticular and other spatial imaging systems are tested and perfected. Along with research and production facilities, it also supports a large kitchen, bathroom and changing room.

### **5.1.4. Fremont Construction and Laboratories**

The DXARTS Fremont Laboratory Warehouse is sited in the light industrial section of the Fremont neighborhood in Seattle. A companion to DXARTS' Raitt Hall, it supports a wide range of large-scale fabrication and studio experimentation that cannot be supported on campus. A former micro-brewery

and independent video studio, the laboratory warehouse is an excellent environment for DXARTS' needs. Along with natural light, two full-size loading docks -- each at opposite ends of the building, 500 amp electrical service, gas radiant heat, and 24' ceilings with completely unobstructed floor space, it has been an exceptional space for our off campus needs. A five year lease was signed in 2004, and demolition and construction on its shops, studios, labs, kitchen and classrooms began in January of 2005. Like Raitt Hall, Fremont needed to be gutted and built-out, and this required substantial time and faculty commitment. Space planning focused on the safest and most logical shop management arrangements, and those then informed the other important activities in the space. Shawn Brixey and James Coupe accelerated and streamlined the move-in process by spending much of the Spring and Summer of 2005 personally building the facilities and assembling the nearly 30 industrial sized shop. The Fremont Laboratory handles the majority of film and sound stage production work, as well as all fabrication and large scale prototyping.



**Fremont Laboratory-Warehouse Woodshop**



**Fremont Laboratory-Warehouse CNC Ferrous Metal Machine Shop**



**Fremont Laboratory-Warehouse Shared Studio Space**





## **Fremont Laboratory-Warehouse Shared Studio Space and "Observatory"**

### **5.2. DXARTS Institutional Infrastructure | Management and Budget**

The DXARTS institutional infrastructure encapsulates both the management structure and the budget.

#### **5.2.1. Management Structure**

DXARTS is primarily funded through the UIF. The budget funds four tenure-line faculty positions, including the Director, one part-time visiting professor, and two full-time research associates who have part-time teaching assignments. A fifth faculty member, former Director and now Divisional Dean for Research and Infrastructure in the College of Arts and Sciences, Richard Karpen, is now supported by the Dean's office. While he has 25 percent time still in DXARTS, he will need to be refunded once he returns to the DXARTS core faculty. In addition, the budget funds numerous professional and technical staff and graduate students as well as operations, equipment, and other items. The Director's position is full-time and runs both DXARTS and CARTAH. Three of the four faculty lines funded through the UIF are contractually committed to spend 75 percent of their time in DXARTS and 25 percent in their home departments which include Art, Design and Dance. The last line -- Mechatronics -- is contractually committed to spend 100 percent of their time in DXARTS and 0 percent in Dance. All four new faculty members were hired as of fall 2007. One was hired at the senior Associate Professor level and the other three were hired at the junior level.

DXARTS recently had its first successful tenure case in autumn 2007 and now has two senior faculty in the cohort. In the past, when there was an approved search, the Director of DXARTS worked with the Chairs of the possible home departments to appoint search committees for the DXARTS positions. These committees generally are comprised of 75 percent members of the DXARTS core faculty and 25 percent participating or host departments. Currently, the host department votes on hiring recommendations after DXARTS has made the candidate selection and written the committee letter. The general historical rule has been the host departments vote in concurrence with the DXARTS faculty selection after the committee has done due diligence. While the host department also votes on the merit, renewal, tenure, and promotion adhering to the host departments' governance structure, in most cases these votes are

made in close collaboration with DXARTS core faculty and these reviews have been organized with the same kind of collaboration and partnership as the hiring process.

In all cases the Director of DXARTS and the Chairs of the home departments work in tandem to make requests and recommendations to the Dean with regard to searches, hiring, promotion, and merit salary increases. The hiring and promotion process has typically gone smoothly, because most host units understandably see DXARTS hires as important temporary collegial solutions in a much longer term process of arts innovation that will create a much needed independent DXARTS School or Department. Given the reality of this unusual situation, the host departments and DXARTS have worked closely on functional working relationships and setting a standard for how the Center and the departments will work in the future. Still these interdisciplinary research and joint faculty relationships have taken a substantial amount of extra energy on both sides to stay informed and to maintain and manage the full understanding faculty lines impact across campus.

Though DXARTS not only works closely with participating units, creating bridges between the Center and those units and also between the different participating units themselves, the program is still fully independent and autonomous in its administration and governance and reports to the Dean of the College of Arts and Sciences. The Director attends the meetings of Arts Directors called by the Divisional Dean for Arts and Humanities and all-college chairs meetings called by the Dean of Arts and Sciences.

### **Administrative Structure and Program Governance**

- 1) Director and Faculty: The Director of DXARTS (currently Professor Shawn Brixey), appointed by and reporting to the Dean of the College of Arts and Sciences, will also act as the Director of CARTAH and also as the Doctoral Program Director. The Program typically has an Associate Director (currently vacant) who is appointed by the Director. The DXARTS Faculty (Core and Adjunct), chaired by the Director, will meet regularly (at least once per quarter) to review and advise on requirements and procedures for the program.
- 2) Core Faculty: A core group faculty, listed previously, have primary responsibility for the development and teaching of the curriculum, for making admission decisions, and for the advising and supervision of Ph.D. students. Core faculty will enact the following:
  - a. New Course Proposals and Course Changes
  - b. Degree Program Proposals and Degree Program Changes
  - c. Acceptance of Ph.D. Students
  - d. Selection of new members of the Core Faculty
- 3) A secondary group of Affiliate Faculty will contribute to the program in a variety of ways including teaching DXARTS courses whenever possible, advising on curriculum and research issues, and serving on Ph.D. Supervisory Committees.
- 4) In addition to the Core and Affiliate Faculty, the program funds two 100 percent FTE research associates/lecturers and a 50-100 percent FTE visiting professor. These rotating positions will provide important additional instructional resources while bringing emerging and mature artists and scholars with different areas of expertise into the program on a regular basis. The visiting artist position is currently vacant as the growth of the program required the use of a portion of the line to fund the long-term lease of the Fremont Laboratory. The remainder of the line's funds are used to bring in numerous one-time lecturers from the widest possible fields of interactions as possible. The Program has the support of five and three quarter full-time staff, funded by the UIF and CARTAH. An Administrative Specialist manages the day-to-day operations of the program including budgets, purchasing, and other management details. Two and three quarter Technical Coordinators oversee the computing, technology, and fabrication facilities. These are arts-technology specialists who provide expert advice and support to faculty and graduate student research projects. There is a Research Coordinator who oversees the running of the combined offices and laboratories containing both DXARTS and CARTAH and manages non-DXARTS projects that are supported as part of CARTAH's mission. Finally, there is an Assistant Director of Academic Services who counsel undergraduate major and non-majors, as well as coordinates the Ph.D. program. Other roles include curriculum management and development, research and documentation for the Center, outreach to underrepresented students, prospective freshmen and transfer students, classroom assignments, scheduling, and development of external partnerships for funding and support.

- 5) The Program chooses a doctoral student to serve as Senior Lead TA. The student in this position holds meetings with the graduate students every two weeks and attends executive staff and faculty meetings where he/she actively participates in the governance and management of the program.
- 6) The Program has funding to support graduate students in positions as Teaching Assistants, Research Assistants and Graduate Staff Assistants. As an important part of each student's education and training involves teaching, laboratory and studio staff work.

### 5.2.2. Budget

The Digital Arts and Experimental Media program is supported primarily by two budgets, the University Initiative Fund budget (59-0449) and the original budget of the Center for Advanced Research Technology in the Arts and Humanities (02-0449), which was folded into DXARTS. The annual DXARTS (59) budget for the period of July 1, 2007 – June 30, 2008 is approximately 750,000 dollars, of which over 635,000 dollars is allocated to the salaries and associated benefits of the faculty, post-doctoral research associates, teaching assistants, and staff. The annual CARTAH (02) budget for the same period is approximately 235,000 dollars of which around 220,000 dollars is allocated to professional staff and graduate staff assistants. Since the CARTAH budget (02) is a regular State budget, benefits on salaries held by this budget are covered centrally. As a non-academic program CARTAH is not specifically under review in this process. However, it has remained an indispensable component of the DXARTS mission and the two operate synergistically to maximize the combined research impact and budgets.

Most of the funds in the annual DXARTS budget (59) that are not used for salaries are used for operations and to support the substantial technology infrastructure of DXARTS, an essential but costly encumbrance on the annual budget. These allocations have been leveraged with great success to secure other sources of funds such as STF which have been vital to DXARTS' ability to achieve the outstanding facilities it now provides to faculty and students. A significant encumbrance on the annual DXARTS budget (59) is for the payment of rent and utilities totaling around 55,000 dollars annually for the Fremont Laboratory. Another important use of the annual DXARTS budget (59) is the allocation of dedicated research funds of 5,000 dollars a year to each of the five primary faculty members and 2,500 dollars a year to each of the two post-doctoral research associates. The total encumbrance on the budget to create this foundation of research support is 30,000 dollars a year. These funding levels are small by standards in many science and engineering areas but they allow faculty to purchase small electronics parts, sensors, performance hardware, tools, advanced and non-standard software, and to travel to conferences and important art venues. The funds are central to the continuing forward momentum of research and artistic production that has placed DXARTS as one of the world leaders in digital and experimental arts.

## 6. DXARTS Community

The success of DXARTS rests on a foundation of interdisciplinarity and community. One of the principle contributions to the DXARTS project comes from the generative relationships with people from other disciplines and traditions. The relationships with people across disciplines and geographical space have allowed DXARTS to put forth a new arts and sciences paradigm that is shifting the university disciplinary culture. CARTAH is one of the best illustrations of the nature of the DXARTS relationship to the community.

### 6.1. A New Arts and Sciences Paradigm

Innovation in interdisciplinary research and education is becoming the standard across the nation and the UW campus. DXARTS has systematically built mechanisms for this and nourished the climate to successfully support more deeply the efforts we have started, as well as instituting new cross-disciplinary efforts in this strategic plan.

DXARTS was established as an autonomous degree-granting unit with the College of Arts and Sciences, a fact that has continued to distinguish the program from its allied programs at other universities. For example, programs such as the Media, Arts, and Technologies Ph.D. at University of California, Santa Barbara operate as part of an engineering program, and the Ph.D. degree in the Arts, Media, and Engineering program at Arizona State University is awarded via the computing and engineering departments. DXARTS Ph.D. students also receive full funding in a curriculum that is primarily practice-oriented and taught by artists that pioneered this field with their own Ph.D.'s from various fields. This remarkable foundation provides an entirely unique re-invention of arts and sciences education. Another remarkable example of DXARTS' new paradigm is that the majority of classes taught as part of the DXARTS degrees have been built in and for the 21st century completely from scratch, often taking advantage of the unusual position DXARTS occupies in relation to affiliate programs on campus. Artists in DXARTS are taught high-level computer programming, to design intricate mechanical systems, manipulate DNA, construct seamless virtual spaces, compose audio algorithms for holophonic sound and produce immersive HD digital cinema. Such a combination of endeavors have, simply put, never been available in a single academic unit ever before.

The award of Ph.D. degrees to artists who successfully fuse such disciplines seems entirely appropriate, due to their repositioning of the role of the artist from reactive cultural commentator to innovator responsible for opening up entirely new areas of experientially embedded social discourse. DXARTS faculty and students are positioning themselves to achieve a unique hybrid identity as both artists and scientists, competing for major museum exhibitions as well as federal grants and opportunities that have previously been the exclusive domain of engineers, physicists, biologists, and other scientists. The regeneration of traditional disciplines by radical programs such as DXARTS suggests a paradigm shift in which artists can challenge scientists according to the rules of their own discipline, and vice versa, opening up valuable new historical, philosophical and educational perspectives, and establishing a new "culture of innovation" at the University of Washington.

### 6.2. Shifts in University Culture

As a relatively small unit on campus, DXARTS faculty and students are able to work together closely on a wide range of interdisciplinary projects. Faculty regularly work together on exhibition and conference projects. Our students will often assist faculty on larger scale projects in order to gain exposure to professional art practices. Our doctoral students are supported in taking classes in other disciplines that often generate interesting collaborations: one student recently won 3<sup>rd</sup> prize at SIGGRAPH for a haptic theremin that he developed with an engineering student. DXARTS also has an annual collaboration with the Dance department known as *Dancing in the Digital Domain*, where a DXARTS Ph.D. student will be paired with a choreographer to produce an original dance performance. The performances are showcased at Meany Studio Theatre, as well as in some cases touring to other venues, such as ACM.

DXARTS does not simply encourage "interdisciplinary research" within DXARTS, it encourages the invention and full participation in an "interdisciplinary culture." Beyond its own rich areas of research engagement, DXARTS has been highly instrumental in helping dissolve unproductive and restrictive

disciplinary and administrative barriers at UW, and has provided remarkable and concrete opportunities for the University to effectively experiment with its own ideas and ability to innovate. While the UIF “budget taxation” mechanism that created DXARTS and many other centers during that period created tension and was openly criticized, DXARTS can clearly be shown as a phenomenal UIF success story. The use of the UIF money was essentially a stroke of strategic genius because it caused the UW to be the host of the first and best program of its kind in the world. DXARTS is frequently lauded as one of the “gold standards” of innovation and integration on campus, including being one of the handful of programs to be directly mentioned by the University president in his inauguration speech to the State Legislature. He also highlighted DXARTS at the kick-off of the University’s 2.5 billion dollar campaign, and DXARTS has also been praised by sources such as the *Chronicle of Higher Education* as the “most innovative” school of its kind in the nation. It is also no exaggeration to state DXARTS has been much more than simply a new art school. DXARTS has in reality become a place for the University to take strategic risks at a meaningful and demonstrable scale, while acting an incubator for very functional and exportable models of interdisciplinary cross-hybridization and interaction among arts, humanities, sciences and other units not seen before. The evolution of DXARTS as an effective incubator on campus has encouraged others to pioneer their own similar directions or collaborate with us through access to our courses, one on one involvement with the faculty and grads, or engaging in directly supported laboratory research under the guidance of CARTAH. Each of these distinct approaches are extremely valuable in assisting the University pioneer sustainable cultural change, and has helped ease the path for many others seeking to work in new and exciting ways.

DXARTS faculty, students and staff are also changing departmental attitudes towards the value of (1) “extreme” interdisciplinarity, and (2) new approaches to education and administration. For example:

- The Library is using DXARTS doctoral dissertations as the critical test case for developing components of a new Mellon Foundation funded digital archiving, scoring and notating system for emerging digitally native disciplines.
- Electrical Engineering and Computer Science have created specific new courses in haptics and embedded systems to annually recruit DXARTS doctoral students into their research cohorts.
- DXARTS administrative staff are given time to develop radical new courses and teach collaboratively with other units outside of DXARTS as a part of their own research practice to advance the functionality of the program and further our campus interdisciplinary synergies.

It is no longer startling that, for example, polymathematic faculty and students from DXARTS are winning awards for designing complex underwater noise cancellation systems to protect marine mammals based largely on the novel synthesis of robotic art works and music composition methods developed in DXARTS, or that undergraduate DXARTS alumni are jointly writing peer reviewed scientific papers in bioengineering on new methods of bio-adhesion that will apply directly to new methods of digital and experimental arts practice as well as neuroscience. All of these examples while everyday occurrences in DXARTS, are still seemingly light years away from any model of an art school most universities have imagined, much less have the courage to implement. DXARTS as a whole has promoted this cultural change through risk-taking, strategic partnerships, and simply hard work that brings success after success. The basic formula is to start by attracting the best and most sought after faculty, train first-rate polymathematic doctoral students under their direction in a revolutionary new arts and sciences practice, have these same faculty and doctoral students work simultaneously in DXARTS and collaboratively in high-end research labs far outside the arts, distinguish themselves both technically and creatively there, and further the growing impact of these interactions by garnering well desired attention externally in the press, conferences, journals, exhibition venues, international colleagues and with funding arenas, as well as internally, especially among students and faculty of vastly different departments. Our faculty and students, who are quite articulate and passionate about the program’s unique culture and benefits, are DXARTS’ best advertising.

### 6.3. Intramural Relations

Building, running and sustaining a truly hybrid interdisciplinary arts and sciences program such as DXARTS is difficult in the traditional academic environments of any large university, even in the highly open and entrepreneurial environment of the University of Washington. DXARTS has been extremely

successful at everything it has embarked on, as well as has been highly applauded and supported at the upper administrative level. Still like all dramatic change, it has been met in parallel with both open arms and some pockets of unreasoned resistance, discrimination and old institutional biases.

The historical tension between the guardians of history, and the vanguards of the future is nothing new, but painfully highlights that most universities are still organized and dominated by the relics of disciplinary history, old administrative structures that support staying put and impede the institution's ability to adapt to agents of change, and where the bottom-line of disciplinary departments are still largely autonomous and in control of the fate of individual faculty members. DXARTS has spent enormous energy educating the University in new collaborative ideas, proven by clear success that they work, that they educate and prepare students remarkably well, produce celebrated and enduring research results, build important alliances, and are indeed exportable and useful to other units across campus. We have worked to consistently show other departments that we are not a threat and, in fact, a vital conduit to a much needed and important shared future. There are surprising partners in DXARTS, new ones emerging and a few no one would have predicted as seeing a new digital and experimental art school as essential to their evolution and future.

DXARTS, like many other hybrid and interdisciplinary programs on campus, has been dealing with these issues since the program was conceived. The situation has improved over time, but remains a concern. While internationally DXARTS is hailed as the new gold standard for education in the combined arts fields, as well as an important collaborator for generating rigorous new research across arts and sciences, on campus we have still needed to demonstrate, in some cases, that our art and advanced technology development is legitimate, and that our presence leads to (a) essential and exciting research, as well as intellectual questions that would never have been proposed by faculty or students had it not been for DXARTS; and (b) excellent new faculty, students and resources being recruited into their departmental cohorts because DXARTS thrives on campus. We know this for certain as DXARTS has become a "destination" for many departments engaging in faculty searches and graduate application reviews as they heavily tout DXARTS as an example of innovative campus partnerships in which they are engaged in. Frequent visitors include: Admissions, Art, Architecture, CHID, Dance, Design, Education, HCI, Computer Science, Electrical Engineering, Law, the Library and many more.

Because we offer our own Ph.D. program and have developed solid collaborations with other campus units, we do not hear the classic complaints of, for example, an Astro-Biology student being "distracted" from what they should "properly" be doing by departmental Ph.D. requirements. Because of our direct funding of TA support for jointly developed courses, other departments have come to appreciate our support of their students and classes, as well as the positive impact our doctoral students have had in their laboratories. Despite the largely positive evolution of DXARTS at UW, it remains true that one of the main tasks facing the Director, faculty, and students of DXARTS is to create and sustain ways to encourage the interdisciplinary contact essential to the Program. Outreach is done enthusiastically, and we have seen the increase of the DXARTS core faculty because of this outreach. While these new core faculty are largely self-selected, we necessarily rely on our core DXARTS faculty and doctoral students that migrate to their labs to secure the quality and strength of the DXARTS presence in any given department, as well as encourage their presence in ours. The informal tie-building has worked well, but nevertheless there are a couple of departments - some original to the UIF - whose disciplines should fill intellectual gaps in our Program, but have no permanent interest, or feel they are institutional rivals, or are units we have made attempts for inclusion but have not yet been able to gain a successful foothold. Examples of areas we have true success and growing connections are Biology, CHID, Computer Science, Dance, Electrical Engineering, Law, Neuroscience, the Library and others. These relationships emerged out of both faculty connections and significant doctoral student research in outside laboratories. A strong example of new additions is Blake Hannaford from Electrical Engineering, the most recently added core faculty member to DXARTS, who is helping develop a joint undergrad and Ph.D. track between the two Colleges and Departments. We see this not as a diminution of our arts focus, but an important way to fully grow the important cultures of innovation on campus.

Units where one might feel there should be strong natural synergies, still have some degree of strained relationships because DXARTS either evolved in small part "out" of them, and/or when we were there we had historical acrimony and resistance to our experimental leanings in the first place. While these are real obstacles for DXARTS, our interactions in many degrees are improving because of efforts on the part of the Director and former Director, and because the students are simply hybridizing. These disciplines that

tend to have small remaining tensions include Art and Music. Generally, the real issues arise because while substantial beneficiaries of DXARTS, they have been the temporary hosts of our faculty appointments on the way to DXARTS being logically confirmed as either a fully independent School, or Department. While we have departmental history with these units, the constellations of serious new research disciplines rapidly emerging in DXARTS makes these units rightly feel ill-equipped to make educated decisions about our faculty research, merit, promotion and institutional investments because they are not at all in their areas of expertise, and they have no mechanism or critical need to understand them. This reinforces their uneasy position of acting in some abstract way as a kind of rubber stamp for our faculty hires, merit, and promotion. While there have been some cases of confusion and activism during merit and promotion, we generally have worked very well, but very hard, to overcome these problems. The recent successful tenure case in DXARTS through Music shows it can be done, but as DXARTS evolves and the rigor and knowledge systems we use to do research and focus our energies accelerates, the need for a fully autonomous DXARTS School or Department becomes inevitable. The risk to the growth of the discipline, as well as to the faculty, students and University is too high to not let DXARTS be the primary and rational body of critical assessment for their contributions to research, teaching and service.

## 6.4. Regional, National and International Outreach

A unique challenge for DXARTS as a new hybrid arts and sciences academic program is to continue to build and sustain our interactions with a broad cross section of interdisciplinary counterparts regionally, nationally, and internationally. As a leader in arts innovation we have begun to build a broad array of strategic alliances that encourage communication between our faculty, staff, and students, affiliated departments within the University of Washington and the community at large. By expanding our involvement on campus, with local institutions and non-profit organizations, and international arts and sciences institutions, we can share our resources and strengthen our status as one of the nation's leading art programs in digital art and experimental media.

As part of our ongoing outreach initiatives, DXARTS is involved locally with art museums such as the Henry Art Gallery, Seattle Art Museum, The Frye Art Museum and the Lawrimore Project to develop rich and ongoing public dialogue, shared lecture series, visiting artists initiatives, as well as exhibition venues for our doctoral and undergraduate students. Another example of regional community outreach is DXARTS undergraduates working at Catharine Blaine Elementary as Student Technologists (part-time Technical Support placement program that is a partnership between University of Washington programs and Seattle Public Schools). DXARTS students were asked to help imagine, create and implement dynamic coursework and new digital arts projects for their faculty and students. The nature of undergraduate studies in DXARTS prepared our students well to rapidly design and teach innovative assignments, as well support some of the technology to exhibit the work. Similar investments by DXARTS supports the Seattle Public School Shadow Program, where cohorts of students from local middle schools and high schools visit DXARTS and then select students shadow a faculty or doctoral student for the entire day, participating in lab research, classroom teaching and discussion, as well as administrative duties designed to give the students an authentic experience of being present in a university work and research environment.

National outreach includes the assistance of faculty and doctoral students building the Seattle based Center for New Cinema (CNC). CNC is a next generation (Seattle International Film Festival-like) national touring "experimental film" festival. Anticipating and fostering the application of new technologies to experimental film making, CNC will project the future of cinema through a groundbreaking film festival and exhibitions. DXARTS is a founding partner with CNC and will assist them bringing on board other universities in the U.S. as both research production partners, as well as exhibition venues.

International outreach is equally broad and includes receiving an invitation to become one of twelve international Leonardo/ISAST Organizational Partners. *Leonardo* is the leading scholarly journal and professional organization involved in promoting research at the intersection of art, science and technology. *Leonardo* includes both a monthly peer review journal supporting the development and analysis of new research in the field, a phenomenally popular book series published by MIT Press, a growing database of scholarly of research papers and abstracts, and an international educational advisory council, moderated by Leonardo Executive Editor, Roger Malina. The Leonardo/ISAST Organizational Partnership Program is one way that DXARTS seeks to strengthen its engagement with international

educational institutions and corporations committed to the art, science, and technology field. DXARTS works with faculty, students and researchers in these organizations on projects of mutual interest including publication projects, internships and special events. Other international outreach activities include Billie Grace (DXARTS Administrative Specialist) attending the 2007 ELIA leadership Conference in Hong Kong. This conference was a significant opportunity for DXARTS to build roads internationally during a time when digital arts programs are being built rapidly and continue to evolve globally, and where DXARTS is a major stake holder in their development. Our membership with ELIA is important to DXARTS because their focus is on international communication between higher education arts educators, and it helps establish the best practice for the development of education in arts, including dance, design, media arts, architecture, music and theatre. Major themes covered at the conference included: arts renewal, dramatic institutional change and new arts investment, strategic partnerships and advocacy.

#### 6.4.1. CARTAH | DXARTS in the Community

The Center for Advanced Resources in the Arts and Humanities (CARTAH) is an excellent example of DXARTS in the community as it sits at the intersection of DXARTS departmental, interdisciplinary, inter-institutional, national, and international work.

As illuminated throughout this document, CARTAH is but one of several predecessor organizations that came together to form DXARTS. While DXARTS and CARTAH are completely integrated from an administrative and functional point of view, the two carry out complimentary but distinct missions. Together they serve the university community broadly and deeply. DXARTS is the academic degree granting unit that provides a world class doctoral and undergraduate education in emerging digital arts and sciences disciplines, as well as deep access to its studio research and upper division courses to many non-majors across campus. It also participates in high-level collaborative projects with other departments and colleges, spearheading both innovative research between these units, and providing a successful model for interdisciplinary synergy that is so important to the university. CARTAH is integrated into DXARTS by providing essential support to faculty and student projects across the Arts and Humanities and beyond. CARTAH supports the undertaking of complex digital media based research that may not be able to be accomplished in a researcher's home department, or where resources and expertise are unavailable to help. CARTAH has greatly expanded access to advanced technology to the university's diverse array of undergraduate, graduate students and faculty, and it makes a substantial contribution to their ongoing education, their instinct and passion for original research.

CARTAH and DXARTS jointly have been significant recipients of funding from the Student Technology Fee Committee -- collectively the third highest ranked on campus -- because of our unique structure which allows general student access, training and support to a wide range of advanced technology facilities. Total STF funding for the past five years stands at approximately 1.8 million dollars. Many early CARTAH and DXARTS' STF proposals were used to provide one of a kind technologies not available on campus to faculty and students embarking on innovative digital media research genres, allowing others to follow their pioneering path. Numbers of these early awards were also centered proof of concept systems and studios that built the rationale and production pipeline for new digital arts and sciences research. Later awards have been built around intelligent cost sharing partnerships and research opportunities with companies like Apple and Avid. This helps to both establish initial technology infrastructure in new areas, sustain those areas as grow and evolve, and finally set the stage for the next generation revolution in those areas once the discipline has matured. An excellent example here would be the initial investment in analog video and tape editing, the revolution of digital video and non-linear editing applied to the same genre but transforming the pipeline, and now HD video as an evolution of the DV revolution. Some of the STF proposals provided for the development of our open computer labs, as well as our live performance systems, 3-D Audio Research Lab and more. The most recent proposals have been dually focused on the synergistic evolution of both our technological infrastructure, and the extension and enhancement of specialized toolkits. For example, the most recent STF proposal called for upgrades to the Open Computing Lab, 3-D Audio Lab, massive 50TB XSAN server and storage systems as well as towards new endeavors including our grid computing standard, hybrid performance technology, embedded systems fabrication, and rapid prototyping. These proposals have helped to provide the equipment level base for advanced research in DXARTS and the campus research equipment through CARTAH and are a critical success in ability to maintain these high technological standards.

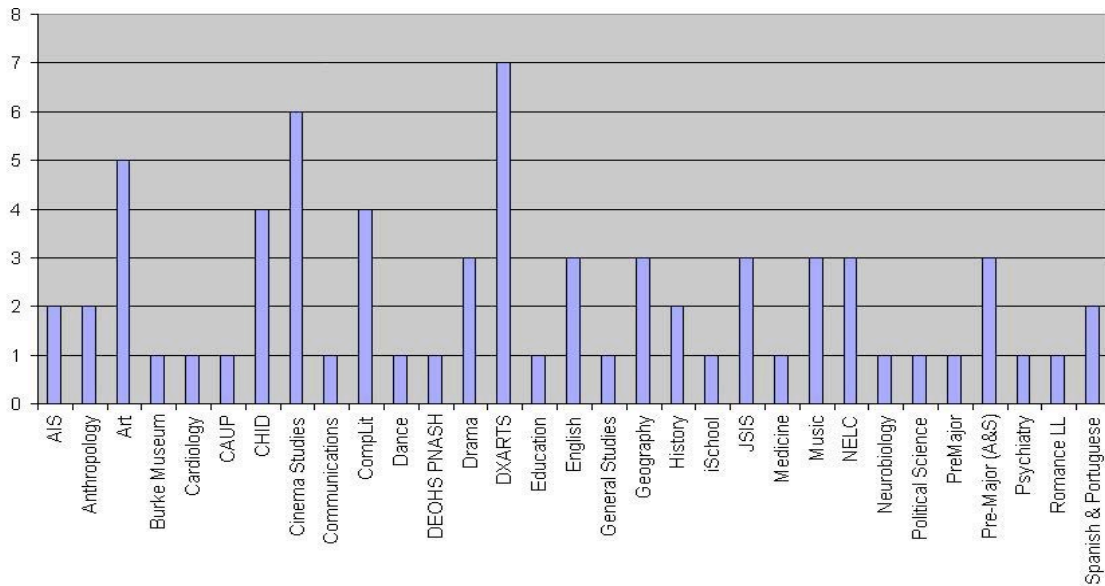
Though CARTAH and DXARTS have benefited enormously from the STF, together they have reinvested their gains back into the campus community. As a further example of the success of CARTAH and



DXARTS, the units have begun to support other units in a unique collaborative research structure, where other allied units apply for STF and other funding, but surrender the resources to CARTAH and DXARTS to manage, allowing other units without the expertise and infrastructure to stake out important research territory while CARTAH and DXARTS share these resources across the campus and inside the program. This is not an example of a service relationship, but one where the mission and goals of the allied programs synergize and extend each others resources and creative reach in innovative and efficient ways. CARTAH has supported over independent 800 projects in five main areas: digital video, digital audio, motion graphics, haptics, digital and textual scholarship. Our structure, expertise, and ability to integrate technology serve the faculty, staff and general student population as well as the DXARTS students.

CARTAH is likely to remain an important venue for access to high-end equipment and specialized software for multiple contributor technology-based humanities research projects. The STF Committee, the single largest provider of hardware resources for CARTAH, sees CARTAH as an important partner in its mission to make technology available to students. Because most humanities projects do not have independent funding, the resources offered by the College, in terms of infrastructure and staffing, through CARTAH are an important component in the development and delivery of humanities research projects. The partnering with the STF, the lack of specialized resources in humanities departments, the need for access by many project assistants, and the central campus location of CARTAH assure an important role for the foreseeable future. For example, new courses are being developed inside CARTAH by staff and faculty, and jointly listed with the Simpson Center. One of these includes CARTAH's Applications of Digital Technologies to Humanities Research, which was first offered in Spring 2005. The initiative undertaken by DXARTS to provide courses for humanities graduate students in the use of technology to build natively digital works of humanities scholarship represents an important and necessary shift in focus from mere project technical support. The course-supported structure provides a process for the transmission and nurturing of a "technical culture" for future humanities research and provides an important bridge for building true interdisciplinarity between the humanities and other disciplines. Additionally, CARTAH has become the site for the coming together of several humanities research groups. The CARTAH Electronic Resources Group (CERG) has weekly meetings attended by principal researchers from OTAP, PORT, UW Digital Libraries, and others who are working to build long-term electronic resources for the humanities. These meetings are informal, but they provide an important face-to-face forum for the exchange of approaches and methods for humanities research. CARTAH receives many inquiries from community-based groups, such as Native American groups and local arts groups, seeking guidance and assistance building digital archives and creating Internet access to their materials. As the graph below shows, CARTAH works with many different departments.

**Graph 2: Departmental Use of CARTAH Resources, 2005-06**



In 2007 CARTAH will partner with Near Eastern Languages and roll out a new variation of this same course, but with a very different focus. With important projects and partnerships, CARTAH now has the opportunity to consolidate the knowledge it has helped create over the last dozen years into course for students in the sciences and humanities. These courses are initially taught using CARTAH's facilities and with administrative support from DXARTS and the Simpson Center. It is an effective and efficient use of combined resources to incubate these additions to the intellectual fabric of the University, and give students access not only to state-of-the-art technology, but also to conceptual and theoretical foundations on which these technologies are based. It provides students with technical and thinking skills to use high technology in areas of research that typically have not taken full advantage of it in the past.

CARTAH has also become the source of other important collaborations including: Near Eastern Languages and Civilizations, Bilkent University - Ankara, Turkey, and the UW Libraries Digital Initiatives. We fully expect that this trend will continue as CARTAH's role in facilitating the dissemination of digital arts and humanities technology and in developing new approaches to research offers new opportunities to partner with other groups. The participation of CARTAH staff on NEH panels for the awarding of grants to support digital humanities projects is another measure of recognition of CARTAH's expertise.

### **Projects of Note**

- TEWA Language Project - Women Studies
- Rørøs Historic Wooden Buildings Preservations - Rijksantikvaren and UNESCO
- Ethnomusicology Instrument Image Archive - Music
- Ethnomusicology Instrument Recordings Database - Music
- Buildings and Cities Architectural Image Archive - Art and Architecture [On-going]
- Hispanic Ballads Project - Romance Languages [On-going]
- Lushootseed Language Project - Lushootseed Research
- Ottoman Text Archive Project - NELC [On-going]
- Russian Morphological Database - Slavic [On-going]
- A Visual Sourcebook of Chinese Civilization - History
- Digital Egypt - NELC
- Silk Road Project - Jackson School
- Zapotec Ethnobotany Project - Anthropology
- Tahirler Archaeology Project - History [On-going]
- CARTAH Electronic Text Archive [On-going]

### **Small List of CARTAH Support Equipment and Resources**

- 35 HD/SD/Stereo Digital Video Cameras
- 30 Studio Quality Microphones, Booms and Digital Recorders
- 30 Apple G5 Intel Quad Core /Dual Head Video/Audio Editors
- 5 Avid HD/SD Xpress Editing Suites
- 25 Manefrotto Professional Tripods Dollies and Gibs
- 10 High Resolution - High Lumen - Digital Cinema Projectors
- 5 HD/SD LCD Field Monitors
- 1 HD/SD/DVI Grass Valley Live Production Mixer
- 15 Arduino Bluetooth Kits
- 5 HDV Mattbox, Anamorphic, Prime Lenses and Filters
- 1 HD/SD Underwater Housing and Bulkhead
- 2 SD Highspeed Programmable Scientific Digital Video Cameras
- 2 LPKF ProtoMat H100 Flexible Circuit Board Routers

## 7. DXARTS Assessment | Curricular Development

While DXARTS is only five years old, and the primary thrust of the report until this point has been a rich catalogue of its current and ongoing activities and successes, as well as a reinforcement of its exceptional ability to deliver on its promise, part of our ability to achieve this kind of depth and success so fast and with such consistency has been because we perpetually evaluate and assess every activity we imagine, undertake and achieve. Because we are small, we receive a great deal of return benefit and efficiency from using every ounce of energy we have wisely. Also, as an agent of the state and of the greater academy, we as researchers and educators have a moral obligation to understand, adjust and align our best practices to affirm our role in educating student citizens, contributing to the quality of life in the state and nation, and serving the University's needs as a world leader.

### 7.1. Past and Current Assessment

DXARTS uses a wealth of formal and informal assessment practices. By default -- being a forward trending academic research unit -- our status quo is a healthy but constant state of self-review and self-discovery. The gestalt of these combined practices in DXARTS range from weekly informal talks with faculty, staff, doctoral students, undergrads and CARTAH clients so that we may maintain best practice, to formally moderated day long retreats dedicated to both solving existing problems, re-imagining what, how, and why we do what we do, to laying precise plans for achieving new horizons that will provide more fully for student, staff and faculty. Every faculty and staff meeting has an assessment section on its agenda, and every staff and faculty can add their input and wisdom into the program's attitude, goals and investments. As required by the University guidelines, all faculty do formal course evaluations with comments and these are reported to the Director and used both the help the professors in teaching, align our pedagogy so we meet the needs of students, and pursue the most rigorous horizons in our discipline.

Further examples include general program guidelines such faculty and graduate students whose course evaluations stay below 4.0 are requested to ask for a visit from Center for Instructional Development and Resources (CIDR). CIDR visits their classrooms, speaks with instructors and offers formal assessment of their teaching practice and guidelines for improvement. Most international doctoral students TAing courses in DXARTS are encouraged to also have CIDR visit.

All faculty and staff must submit a "Yearly Annual Report" to the Director and meet for an annual assessment and performance review. The Director submits to the Dean and Divisional Dean of Arts and Sciences an annual report, which assesses both the achievements of the program, as well as the emerging and ongoing concerns. DXARTS submits regular assessments on a wide range of topics from space usage and needs, resources and computing, to diversity and recruiting.

A stunning example of DXARTS' assessment vigilance in action was a complete overhauling and restructuring of the DXARTS B.F.A. degree program less than three years into our first admissions. While the B.F.A. was beautifully designed and perfectly functional in its first construction, early data on the shift in focus and demographic of incoming millennial students, the steady increase of women seeking DXARTS as an equal-technical but more creative alternative to science and engineering, as well as an increasing focus on supporting under-represented minorities, all suggested a streamlining of the degree and creating a new set of capstone requirements. Additionally, a fulltime advising position was created to manage the double and triple majors DXARTS seemed to naturally attract. As a detailed part of the restructuring of the B.F.A. we also undertook a radical internal assessment of "writing in the major" as a way to understand the multivalent learning systems students used in DXARTS as well as to possibly accelerate the emerging interface we were seeing evolve with CHID and other cross campus digital humanities activities. The College of Arts and Sciences along with the University's Office of Educational Assessment (OEA) were enthusiastic of the depth and ingenuity of the faculty and students contributions to the assessment survey and process, that they have awarded DXARTS more than 45,000 dollars in two separate funding requests to advance and prepare to share and export our growing knowledge across the campus.

Not all assessment in DXARTS is curriculum focused, nor happens at the undergraduate level. The rapid rise of demand for DXARTS faculty, and doctoral students to participate across campus, in exhibitions,

and in innovative research internationally provides both data for measuring success and impact of DXARTS on the University and the international community. These activities provide a solid assessment tool for strategic planning, as well as offer integrated views that foreshadow emerging needs for massive expansion of our physical plant demand in areas like mechnronics and robotics, Computer Numeric Control Manufacturing, as well as on our computing infrastructure and classroom usage. The success and visibility of our faculty through awards, exhibitions, and tenure are also distinct assessment tools that can be used both to confirm rigor and excellence as well as strategically plan. Along with assessment of faculty, research, students and teaching, we also collect and use significant data and statistics from the communities we serve, including CARTAH clients and non-majors that make up a substantial percentage of our activities, investments and commitments. Further, we continually collect and assess data on graduate application submissions, first round acceptances, the online applications, acceptances and rejections to all our courses, as well as to the undergraduate degree program, and student demand for the major as collected by the University Office of Admissions.

## 7.2. Future Formal Assessment

With DXARTS' successful conversion from a UIF to a School or Department, and subsequent faculty hiring and tenuring, more collaborations maturing, as well as a steady state of graduating doctoral students building research and gaining employment, and undergrads moving through the program into graduate school, we can commence a more detailed, continuous, and quantitative analysis of the program's problems and progress beyond the assessment systems we currently use and have in place. The assessment effort will be built into the digital backbone of the program and naturally provide information on performance to many groups with different interests, such as students, faculty, administration, international and professional organizations, and federal agencies. As a natural part of our evolution we are preparing to build on the constellation of assessment input to the program and develop the following,

(1) We will evolve our current UIF advisory structure to include a formal External Advisory Board, asking them to evaluate our progress every two to three years.

(2) We are considering adding to and/or more significantly formalizing an Internal UW committee (constituted of non-DXARTS core faculty) to review and advice on our interdisciplinary policies and progress, every two to three years. The Astro-Biology and Urban Ecology IGERT Program has such a committee, but we are undecided, given our small size and other collaborating programs reviews and time commitments we will share.

(3) It is very likely that given the rapidly advancing national trend in hybrid arts and sciences programs such as DXARTS, we will be successful in being awarded multiple NSF IGERT's. This transition of a UW digital arts unit receiving NSF funding will require a new kind of quantitative analysis and assessment system to be developed and used for us to advance our program. The DXARTS Director along with five other major university programs similar to DXARTS will be meeting with the head of NSF in January of 2008 to strategize a new set of guidelines and research goals for this growing field. UW's Center for Innovation and Research in Graduate Education (CIRGE) have become leading experts on Ph.D. education on campus, and were an integral part of the UW's successful Urban Ecology as well as Astro-Biology IGERT's, for which they designed both quantitative and qualitative assessment instruments. We will seek their assistance as well as other partner's on campus involved in IGERT review and renewal to help us design novel evaluation tools for our growing field. Thus, institutional knowledge and experience from DXARTS will be blended into all UW IGERTs and will help UW systematically collect and analyze data to be distributed to NSF, the greater educational community, and IGERT faculty and students. Some new assessment tools will be used to discover the differences between DXARTS students and students with traditional science and engineer Ph.D.s ("peers"), CIRGE could possibly help design, administer and analyze biannual surveys to all our groups and national peers. Further, they would inquire into educational experiences, career goals, and final outcomes, e.g., comparing first employment after the Ph.D. in DXARTS versus other disciplines. CIRGE would help us interview DXARTS students annually, inquiring about their motivations for studying under our particular collaborative IGERT's, their expectations of program content and structure, their experiences with interdisciplinary learning and teamwork, and their recommendations for change. Every two years CIRGE could conduct interviews with faculty about their goals, their evaluation of the program and their concerns. The IGERT renewal process could tap CIRGE to seek information on the impacts at college and department levels. We would hope

for heightened awareness of DXARTS' successes to significantly aid UW's commitment to our program longevity beyond IGERT funding, as well as be useful nationally for other programs like DXARTS to use as a benchmark for rigor, impact and value. Annual summary reports with recommendations for evolution in the program will be shared with all participants and discussed during a year-end meeting. In order to make our ongoing experience available to the wider community, the assessments could also be posted on the DXARTS website or IGERT blog. In support of this effort DXARTS will ask the Graduate School for funding of one RA/yr for CIRGE in keeping with the standard set with Urban Ecology and Astro-Biology.

### 7.3. Assessment at Work | Diversity in DXARTS

As the review and restructuring of our B.F.A. program illustrates, DXARTS is committed to providing a diverse community of artists and researchers, faculty and staff that is encouraging and welcoming to all. We believe that DXARTS as a discipline is particularly important to the diversity mission of this and other universities. The program uniquely combines advanced high-technology with artistic and humanistic research and scholarship bringing together two broad areas which are further enriched by a diverse population working in culturally diverse subjects and methodologies.

DXARTS recognizes the importance of role models among the faculty in recruiting and retaining a diverse student and staff population as well as enriching the intellectual life and quality of its programs. We view the issue of diversity holistically, flowing through every area and level of our program including undergraduate and graduate students, faculty, staff, and other affiliates. We believe that enhancing diversity within the faculty is an essential part of any serious plan to increase diversity throughout the population at a university and this high priority and is reflected in our most recent faculty hires. We are also especially sensitive to the unique challenges and barriers encountered by women in high-technology fields. This is an issue that impacts Digital and Experimental Arts, a field that requires deep and broad knowledge of science and technology along with the central artistic knowledge that all of our researchers and practitioners must acquire. Thus, we have made special efforts to recruit women into our program as faculty and students (undergraduate as well as graduate). We are pleased to have been able to achieve a near 50/50 gender parity ratio in the doctoral program. We have conducted successful searches for three faculty positions over the last four years resulting in hiring a person from an under-represented ethnic group and a woman for two of the three positions (composer Juan Pampín and artist Stephanie Andrews).

While we have had success at the faculty and graduate student levels we felt that we needed to redouble our efforts at the undergraduate level to increase diversity among our B.F.A. students. Over the last year we have made significant progress in hard numbers, and in some classes such as "digital video," the women outnumber the male students five to one. We expect this trend to continue very positively. Therefore, we believe we are headed in the right direction at the undergraduate level yet acknowledge that there is still more work to do.

#### 7.3.1. Plans to Improve Diversity

With very healthy ratios of women and underrepresented minorities on faculty and staff we are now developing and experimenting with specific strategies for recruiting women and underrepresented minority students that include:

- DXARTS includes qualitative as well as quantitative indicators of achievement and potential in admissions applications. DXARTS faculty take a hands-on approach to recruitment through direct interaction with nearly all of our prospective Ph.D. students. Through on-campus visits by applicants to extensive email conversations with those who cannot travel to Seattle, the DXARTS faculty go far beyond what we see as the norm in communicating with prospective students before they apply so that we can help them put forward the best possible application. Every inquiry about our program is forwarded to a faculty member who then responds to the prospective student often beginning a more extensive interaction. DXARTS puts a lot of emphasis on the Statement of Purpose section of the application to our Ph.D. program. Faculty will often work with prospective students by previewing their applications many months in advance to help them develop strong qualitative statements. Our faculty members spend significant time in this role working with women and underrepresented minority prospective students, as we believe personal one-on-one communication with faculty can resolve many concerns and apprehensions that students may have. While we are

extremely gratified that these particular investments have already yielded strong gender parity in our doctoral cohort -- that is typically steady at nearly 50/50 female to male ratio -- DXARTS is working on new methods of promoting our program to targeted schools with significant minority populations and also helping secure funding for minority students through targeted departmental fellowships and the Graduate Opportunities and Minority Achievement Program.

- At the undergraduate level, we are promoting our programs through advisors and faculty representation at local school and University sponsored career awareness events. We use similar strategies with undergraduates as with graduates regarding personal attention from our faculty. Professors Andrews and Pampín, mentioned above, have taken on the roles as our primary undergraduate advisors. Future strong and diverse pools of graduate students and faculty rely upon a strong base of truly diverse undergraduates. To facilitate the development of a diverse undergraduate base we believe we need to start with K-12. We have invited classes from local schools to visit DXARTS and during presentations reflect upon the importance of diversity in the arts and technology and encourage students to consider our field as one in which they can achieve greatness. We have participated every year in the Campus Open House in late April and we have been sending out letters to all high-school art teachers in Washington State to invite their students to attend. We use this event as another opportunity to welcome and encourage young women and minority high school students to consider DXARTS as a program that can both prepare them for the high-tech future while also giving them a lot of room for self-expression. Future participation in WISE (Women in Science and Engineering), GEMS (Girls in Engineering, Math and Science) and GEAR-UP (Gaining Early Awareness and Readiness for Undergraduate Programs) has also been identified as a viable means to enhance diversity through recruitment and outreach efforts.
- DXARTS partners, with other departments at the UW, promote diversity through access to our advanced technology labs and studios not only to a diverse population but also to those researching culturally diverse subjects. Through its CARTAH lab, DXARTS has a long track-record of promoting and supporting scholarship in areas such as Native American Language preservation, Ethnomusicology, Ethnic Studies, Women Studies and other areas. As a service to the UW community, DXARTS is currently supporting a widely diverse array of projects by students and faculty not directly affiliated with our program. A majority of these projects are being led by female students and students of color from disciplines across campus. Many of these projects involve the creation of digital cinema with subjects directly related to these students' own cultures and aspirations. DXARTS provides equipment, studio space, and consultation. Our own graduate students often act as technical consultants to these projects creating a flow of ideas and knowledge throughout our facilities.
- DXARTS is committed to at least a second year of full funding for our GOP recipients. In most cases we expect to fund such students for a third year as well.

In our curriculum, our labs, and studios, and in the social aspects of the Center's activities students experience the expression of the diverse cultural and social values of their instructors, of their fellow students, and of themselves. The values of teamwork, collaboration, and mutual respect is palpable through all of the scholarship and artistic activities in the Program. DXARTS in large part is a "laboratory culture" with students and faculty often in labs and studios together for long periods of time working together or working in proximity to each other on individual projects. The nature of the work being produced often elicits spontaneous and quite significant discussions about all aspects of our diverse society. In particular, DXARTS has created a Graduate Student Research Lab which 17 graduate students share as their primary office space. This is already becoming a fascinating think tank where a diverse group of students are learning about one another while learning to work together.

### 7.3.2. Examples of DXARTS Annual Outreach Programs

#### **Native American Student Day | November**

Over 200 Washington State Native American high school juniors and seniors were invited to attend a two-day event to visit campus and learn about educational opportunities available to them at the UW. DXARTS doctoral student's, hosted a group of 10 who visited the labs at DXARTS and talked about research and practice in the arts. Two of the ten students who

expressed an interest in our program applied as freshmen in 2006.

### **UW Majors Day | Bellevue Community College | January**

DXARTS joined other UW departments and programs to staff information tables and provide information regarding degree options to students at BCC. BCC serves a diverse population of students, including high school students participating in Running Start, non-traditional age students, students of color, and first generation students.

### **Husky Experience | University of Washington Campus | April**

Professor Shawn Brixey presented a keynote address in April to high school seniors who had been offered admission to the UW (and their parents) but who had not committed to attend. Undergraduate adviser, Cynthia Caci, staffed the event on all three scheduled dates to help students learn more about opportunities in the Arts, academically and outside of the classroom. Coordinated by the Office of Admissions, the students who attended this event come from a broad range of backgrounds and experiences.

### **Diversity Scholar Invitational | October**

DXARTS graduate students set up several labs with student work and hosted seven prospective freshmen (high achieving, underrepresented high school seniors) to demonstrate the research, resources and opportunities for students interested in exploring the arts and the UW with the goal of increasing the number of underrepresented students on this campus.

### **UW Majors Day | Shoreline Community College | October**

Recruitment effort to provide information to prospective community college transfer students and Running Start freshmen. Student population at Shoreline is highly diverse, with a large representation of international students.

### **UW Majors Day | Seattle Central Community College | November**

DXARTS joins other UW majors and programs to inform and recruit prospective transfer students and Running Start freshmen. SCCC, as a main feeder school to the UW, provides our program with rich opportunities to attract a diverse student population to DXARTS.

### **7.3.3. Student Access and Opportunities**

Although a competitive undergraduate degree, DXARTS provides broad access by reserving a minimum of 50 percent of the seats in each 400-level course for non-majors. With this unique open system, over 750 undergraduate and graduate students from more than 30 different departments have been able to participate in our courses, labs and studios since the inception of our program in 2001. This is an impressive number, given that our courses are limited to an average of 25 students. This philosophy, based on the knowledge and grounded in the belief that diversity of thought, perspectives, learning styles and discipline-specific methodologies are critical to a dynamic, challenging and valuable learning environment for all participants.

### **Engagement with the external community**

DXARTS is committed to sponsoring inclusive events that appeal to our diverse faculty, student population, and the community at large. These programs are designed to provide an open and accessible environment for all to experience the artistic practice and research interests of our faculty and students.

### **DXARTS Open House and Orientation | Washington Weekend | April**

Along with Art, Dance, Drama and Music, the Center for Digital Arts and Experimental Media extended an invitation to high school and prospective transfer students in the Puget Sound region to attend an open house to learn more about areas of study available at the UW in the visual and

performing arts. Faculty conducted several orientation meetings that day. Labs, studios and facilities were open for touring with specialists present in each area and examples of work created by undergraduates and graduate students.

### **DXARTS Spring and Autumn Concerts | Meany Theater | April and October**

Twice annually, the Center for Digital Arts and Experimental Media produces an evening of experimental music, video and performance for the campus community and beyond. Prospective students are invited to attend and learn more about the artistic practice of the Center. This year, complimentary tickets will be offered to students in local high schools with large populations of underrepresented students.

### **Outreach Mission**

The Center for Digital Arts and Experimental Media recognizes the importance of “high touch” when it comes to recruitment and retention of all students, but most especially historically underrepresented students in this field. The collective efforts of our faculty, staff, and current students to reach out to, support, and inculcate perseverance in all of our students, through personal contact, strong mentoring relationships, and the articulation of high expectations balanced with a equal amount of constructive feedback and guidance, has resulted in a notably diverse community of scholars. We acknowledge that the work must not only continue but also expand in creative and substantive ways. We are committed to the process and to the goal.

## **7.4. Assessment at Work | DXARTS Writing Initiative**

DXARTS works closely with the Office of Educational Assessment (OEA) on many assessment projects, most recently on a writing initiative. From the unique DXARTS model of research and education a new generation of renaissance hybrids (artist-engineer-scholar) are emerging and blurring the distinctions that separate the creative arts from science and engineering. The emerging field in DXARTS embraces an expansive range of arts practice, theory, and investigation across multiple disciplines through faculty research, and rigorous graduate and undergraduate degree programs.

More specifically, the undergraduate studies program is highly interdisciplinary in nature and draws heavily on disciplines in technology and science with specific application to musical, performing, and graphic arts. The preponderant concern that students come into the program having taken a full sequence of science courses, combined with the expectation of technical proficiency in one of the arts has, in effect, meant that students have no formal opportunity to develop skills in writing about art and technology. Additionally, alumni surveys consistently report that UW alumni wish they had more rigorous writing training while undergraduates, no matter what their major. This state of affairs can be summed up quite simply. Namely, though there are numerous opportunities for quality writing in DXARTS courses, undergraduates currently have no writing requirement in their major area of study.

While the majority of DXARTS laboratory courses have writing components, none of the courses as configured meet the university W-course requirement. Therefore, DXARTS and OEA generated the following plan.

### **Implementation Design**

- Designate a faculty member to design a process for identifying and implementing writing opportunities within the DXARTS major.
- Provide R.A. support to collect best practices in arts, humanities and sciences writing.
- Identify newer writing assisted technologies including: Real Simple Syndication (RSS), Resource Description Framework (RDF), and related open-source software tools, such as Protégé hardware and technical support for building DXARTS writing resources.
- Investigate linked subject matter and writing courses, such as those offered through IWP, or with existing studio courses or newly developed offerings.
- Inform the development of undergraduate writing within the parallel departmental discussion of the nature the written dissertation component of the DXARTS Ph.D.

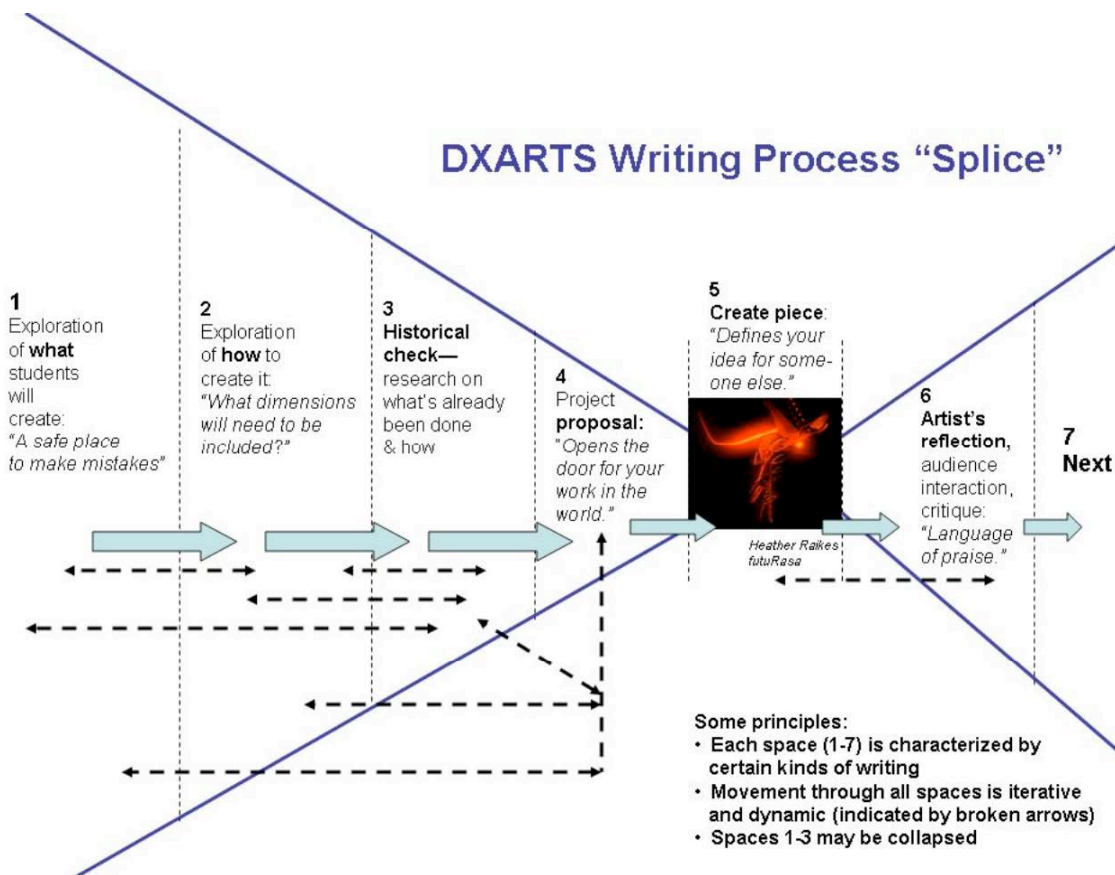


## Learning Goals

- Provide students with innovative and powerful educational writing experiences.
- Link writing experiences to course work.
- Link writing experiences in the form of published contributions to online archives, reviews, and journals.
- Link writing experiences to exhibition catalogs, public arts proposals, and other types of research and proposal writing appropriate to the disciplines.

Additionally, because DXARTS is a new unit, both in form and practice, the combined community is dedicated to making its practices and techniques transparent to the outside community. Therefore, as part of the writing initiative, faculty worked with Catharine Beyer from OEA to articulate the DXARTS “writing process” for a broader audience. The emerging process generated the figure below.

**Figure 2: Visual Representation of the DXARTS Writing Process “Splice”**



## 8. DXARTS Needs and Concerns

DXARTS' central needs and concerns are both easily articulated and, with a commitment from the UW administration, have tangible solutions. First, it is critical that DXARTS be freed from the nest of the historical disciplines that birthed it and be allowed to reach its full potential as an independent Department or School. Second, DXARTS and the collected departments that work with DXARTS are very concerned with finding a replacement for the faculty position vacated by Brixey when he became director of DXARTS. Third, in the face of growing demand for DXARTS courses and resources from students, it is critical that more space be allocated to the DXARTS teaching and research mission. Finally, many of the essential DXARTS staff positions are funded with soft money -- a situation that must change.

### 8.1. Evolution | School or Departmental Status

DXARTS is poised to continue to make historical contributions to the future of the arts and sciences by making as yet unforeseen discoveries. An essential next step is for DXARTS to become a department or school as soon as possible.

DXARTS is widely recognized as having pioneered the new set of "gold standard" benchmarks now being adopted nationally for digital arts research and inquiry. Without hyperbole, the program has already made history. Locally DXARTS has quickly emerged as an integral feature of the intellectual and academic vitality of the University of Washington. DXARTS clearly has begun to form a new cornerstone for the invention of hybrid fields of creative arts, scientific and scholarly research. Given the program's level of documented success, deep impact and emerging importance on campus and the nation, any impediments to its continued success should be removed subsequent to this review process. DXARTS needs to take the natural next step in its evolutionary process and become either a fully independent School or Department. Once this happens, DXARTS could be organized around a unique interdisciplinary upper administrative reporting structure. The most rational reporting model should not underestimate DXARTS, but anticipate its geometric growth potential and other interdisciplinary programs like it on campus by allowing it to immediately start the negotiation process between the Provost, Deans of Arts and Sciences, Engineering and other colleges and schools to determine the most progressive structure.

While DXARTS acknowledges the importance of the historical disciplines it emerged out of, and encourages a wealth of ongoing contact and continued collaboration, DXARTS should no longer be expected to continue to rely, for issues of such strategic and academic importance, on the well meaning but less than qualified judgment of those who limit their own modes of practice and knowledge of media to that of previous centuries or who use new technologies with only an amateurs level of competence at best. It is unsound for DXARTS, for the host departments of DXARTS faculty, and for the strategic needs of the University to continue to vest authority in departments without unquestionable knowledge of every aspect of DXARTS to determine the needs, strategic hiring, merit, and the tenure and promotion of its faculty. And DXARTS faculty must no longer find themselves in the ambiguous position of doing the teaching and research of an FTE within DXARTS and having to do what amounts sometimes to double duty in order to be seen as a viable member of their home departments for evaluation. While a useful initial mechanism to allow the program to start, to hire new faculty, and to achieve the current phase of success, this awkward host system is now impeding DXARTS needed autonomy and its ability to serve its growing community and the larger University. The University cannot reasonably allow departments without the daily realities of managing future Federal funding, human subjects, laboratories, extensive advanced computing facilities that could equal those in the sciences and engineering, to accurately gauge the importance on the widest range of emerging disciplines and programmatic investments we need to make, and where they rightly have no vested interest other than earnest collegial support.

### 8.2. People | Faculty Director Replace Request (Brixey)

DXARTS has been seeking for the past year a replacement position it views as largely *pro forma*, and essential to prevent diminishment of DXARTS, and to ensure the stability of the program as well as its service to other allied units in the College that depend on DXARTS courses and laboratories, and to maintain the proper level of commitment to the University's substantial investment in DXARTS.

When the current founding Director of DXARTS, Richard Karpen, was named Divisional Dean of Research and Infrastructure for the College of Arts and Sciences as of July 1<sup>st</sup>, 2006, the College named Co-Founder and Associate Director Shawn Brixey sole Director of DXARTS. While this move clearly highlighted the success of DXARTS and its founding faculty, the structural shift was in reality a net loss of two faculty positions in. While Karpen's line was replaced Brixey's line was not, leaving only three junior faculty and two postdocs doing the primary teaching in the program. Brixey was a highly coveted faculty member in the classroom and a powerful influence in the DXARTS doctoral research domain. Brixey was also the driving force behind DXARTS' massively successful Digital Video Research area. His digital video courses receive hundreds of applications each year, and in the past three years alone his video students have won multiple Mary Gates Venture Grants, a prestigious MTV Incubator Award, were included in dozens of international film festivals, art directed a feature film by renowned Canadian film maker Guy Maddin, and were accepted into graduate film school at Columbia University, New York University, University of California Los Angeles, The Chicago Art Institute, The University of Illinois Chicago and The American Film Institute in Cinematography (AFI is the single most prestigious film program in the United States and Cinematography is their most fiercely competitive field).

Every effort must be made to successfully replace Brixey's role in the program, as well as strategically recast his position to accurately reflect the changing needs of this dynamic discipline and advance the natural growth of the DXARTS mission.

The plan for replacement in Brixey's area is hypercritical for DXARTS, the College and University. Along with a geometrically increasing demand inside the program for video courses, a growing list of allied programs across the College and University such as, Art, Dance, CSE, Communications, CHID and Cinema Studies use his DXARTS video courses for their majors. DXARTS provides for these campus wide Digital Video needs very well, as witnessed by the dramatic range of technical and creative awards, graduate school offers, and large enrollment request numbers previously listed above. DXARTS offers a host of selections in the field from both year long digital video sequences, one quarter experimental intensives, summer quarter feature length production studios, Discovery Seminars in Digital Video, as well as advanced and doctoral level courses in Motion Graphics, Special Effects, Video Installation and Real Time Digital Video Processing.

While Brixey's primary field of teaching has been in Digital Video, his primary area of research has expanded the field of video into Interactive Installation, Robotics, and Telematics. He has been able to serve DXARTS and the College in multiple teaching and faculty research capacities, providing the foundation and lead in these new areas. Digital Video has witnessed the same dramatic changes and integration of new tools and methods as Computer Music. The scope and requirements of the field are simply not just movie making, because video has become a primary language of inquiry that is being used in nearly all disciplines. Video has also grown and expanded in complexity to include Augmented, Stereo and Virtual Reality Systems, Interactive Video Environments, Telematic Video Performance, and Real-Time Data Driven Cinema, not as experimental extensions of video but as mature disciplines in their own right. DXARTS *must* fill this position. It is a priority. It is fully integrated into the joint DXARTS/CHID and the joint Dance/DXARTS requests discussed later in this study and it plays a central role uniting our research interaction with those units. It is a cornerstone of the new history, theory and practice of the digital arts revolution, while providing truly unique interdisciplinary research and much needed service to the College, and the University.

The Digital Video position further interacts with a wide number of other branches of the University community in our research practice including The Simpson Center, CHID, Dance, Drama, Native Voices, Cinema Studies, Electrical Engineering, Industrial Design, Communications, HIT Lab, CSE, HCI, Information School, the Law School and many more.

### 8.3. Environment | Space

As mentioned in almost every section, DXARTS well managed but exponential growth and UW's appetite for it still has created a significant recursive demand loop that cannot realistically be sustained without adding some resources, or watching severe damage be done to the fundamental needs of the program and the University in DXARTS. The original space allocated to DXARTS in Raitt Hall was eclipsed by the first year of the program. We have experienced a precisely scheduled expansion in the number of faculty and courses we deliver, but have completely out-paced and out grown the small amount of initial space

assigned to us in Raitt Hall. The Fremont Laboratory alleviated some of that demand, but uses up significant funding for other needs by solving the huge space shortage. Because we are temporarily a UIF we have some short-term flexibility in the way funding is used toward solving problems, but the real issue is still funds, space and faculty. Finding an on-campus space solution has been a serious priority for DXARTS the last two years.

If permanent campus space that is useable for our needs is found we can recapture the substantial savings and possibly apply it toward the creation of a new faculty position. While using other campus space like general classrooms temporarily is possible, and has been used, we found the overhead of building out each classroom with discipline specific advanced technology three days a week, or even a quarter at a time is exhausting the staff, our students and devastating on our budgets. As mentioned, DXARTS leased a 5500 square foot off-campus space in Fremont to do essentially what could not be done on campus within the space location we were given in Raitt Hall. This facility has been very successful, right sized, and allowed for our planned expansion, but the lease will run out soon and we can no longer realistically afford to spend departmental monies to lease commercial space to teach a program's degree requirements. The university simply must help assist with more space or funding allocations if it wishes us to continue doing the extraordinary things we are engaged with. The UW current release space process would allow for DXARTS to finally be able to manage and right-size its growth, stabilize the curriculum with dedicated lab/classrooms, and use budget allocations for other critical path projects that must come online.

We anticipate a departmental cost savings of 55,000 dollars annually which could if necessary be re-purposed to building out the newly allocated campus space, or even be use in small part annually to partner with the university to offset the costs of our long term use of premium campus space. There are also economies of scale in staffing, resources, as well as increased research productivity through co-locating the labs, classrooms and offices. Eventually we are confident we will be able to generate income for DXARTS that could contribute to paying for some of the space from grants like an NSF IGERT and other contracts. While we do not foresee that for a few years since initial external grant budgets amortize start-up costs, DXARTS would be open to a novel financial arrangement. An example might be using the cost savings from the off-campus lease to do some or all of the construction costs for the first five years of occupancy. Then begin paying a small amount annually as we grow and begin to bring in external grants. Our ideal configuration would be 5500-8000 sq ft of contiguous laboratory, classroom, cluster, machine shop and office space, accessible by each area of focus. While these examples of space listed here below are not necessarily the requested campus spaces, they will serve as examples of what would be ideal.

Example 1). The former library in the basement of Bloedel Hall with its high ceiling, large regular repeating alcoves that can be re-purposed for small shops, labs and offices, and the center space for classroom, lectures, charette's. The former Bloedel Library with its pre-existing plumbing, and service elevator would allow for all the functions listed above to be accomplished. The current cost estimate for ADA retrofitting has made Bloedel nearly impossible for others to use permanently. However because DXARTS can accommodate all the ADA students we have in Raitt Hall with equal resources, Bloedel would make a perfect choice. The issue is Raitt Hall simply cannot accommodate the entire doctoral cohort's research infrastructure.

Example 2). Raitt Hall's non-DXARTS spaces currently held by other programs that might move to the new UW Tower or elsewhere, also including basement general assignment classrooms. These Raitt Hall spaces could be brought into alignment with our current facilities and would require less space, less cost and easier management because of dual purposing. Some of the lost general assignment classrooms in Raitt could easily be recaptured and actually improved out of other release campus space.

## 8.4. Scale | Advising and Staff Positions

The initial small size, large scale success and enormous appetite for everything "DXARTS" on our campus has fueled scalability problems that will plague the program and seriously impede the quality of research, education and services we offer unless they are addressed.

With a recent DXARTS tenure and numerous pending sabbaticals (Pampin 2008, Brixey 2009, Andrews 2010), DXARTS will be at a perpetual net loss of faculty to teach required areas of the degree program as

well as sustain the doctoral research areas. The situation is further complicated by our staff position in advising and students services that is only in DXARTS on additional soft money. Because we are currently a UIF and have some flexibility in the way we allocate funds, the programs salary contribution to this line could easily go to a joint faculty hire with another collaborating unit taking needed teaching pressure off the program, but then would leave such an unmanageable hole in critical services that the faculty or administrative staff could not begin to cover, thereby more than negating the value in the teaching and research time recaptured in the new hire.

Another example of scale and personnel issues is the Fremont Laboratory facility management. To run an OSHA certified and safe facility of the enormous complexity DXARTS' needs for its research and teaching, more temporary money from a potential faculty line has been used to stabilize this wholly necessary facility. The loss of both this position and facility for part of a faculty line would again do what the previous advising line would, leave a massive hole in the program that is twice as bad as the already unbearable position we are headed into with not enough faculty. An IGERT would help temporarily solve some of this bottle neck, but still only solve some of it temporarily while also generating its own needs and complexity that would absorb a lot of the funding. The issue of increasing DXARTS' resources and funding to a manageable size with appropriate faculty and staff lines needs to be immediately and directly addressed.

## 9. DXARTS Strategic Initiatives

As highlighted in the section on assessment in DXARTS, the program has a voracious appetite for new challenges that build from its interdisciplinary arts and sciences research mission. The DXARTS community is working on a wide range of strategic initiatives and this section will highlight only four of them. First, DXARTS, in response to faculty and student research as well as considerable demand within the broader UW and regional community, has been serving as the defacto generative digital cinema program -- a role the program would like to formalize, stabilize and strategically plan for. Second, DXARTS, along with CHID and Dance, would like to further formalize an already close knit relationship by creating two joint faculty positions. Third, DXARTS would like to tighten its ties to the community by asking the UW administration to work with it to seek revenue sources for two endowed professorships. Finally, DXARTS plans on taking the exciting steps of developing innovative NSF IGERT and ISE grant applications, with the assistance of two other departments committed to an interdisciplinary mission, EE and CSE.

### 9.1. Synergy | Digital Cinema Program

With DXARTS being an industrious incubator of new horizons, research and collaboration, it also has the distinction of being a very useful early warning system that highlights bottlenecks and problems the University could use to solve them before they become severe. Another example of numerous growth issues is that DXARTS tracks applications and denial of admissions on all of its courses. The numbers of admissions denials program wide for sound, animation, and mechatronics are substantial, yet the largest numbers of denial of admissions by many times more are in Digital Video. Digital Video is also where DXARTS has had remarkable success with the majority of our undergraduates applying and receiving admission to graduate school in digital cinema. Even with the additions of new one-quarter video intensives, as well as adjusting the curriculum to be extremely difficult, denial of admission to our Digital Video courses can easily hit 100 plus annually. There is enormous pressure that needs to be met immediately for a high-level generative digital cinema degree at the University of Washington.

From the broad spectrums of Hollywood to independent film, Sundance to the Seattle International Film Festival (SIFF), planetary exploration to machine learning, military surveillance to medical endoscopy, MoMA to YouTube, the world has witnessed an exploding fascination and deep investment in every form and iteration of digital video. There is a rapidly growing demand for a uniquely Washington experimental digital cinema school that is both rigorous and inventive. The UW student sponsored Film Club, ASUW, UW Extension, Drama, Comparative Literature Department, and English Department all are interested in having digital cinema on campus as an academic program, but none of these units wants a commercial Southern California style film school, nor understands the enormous complexity of experimental film production the way DXARTS does. On one hand, DXARTS has over three million dollars worth of digital cinema production resources including fleets of state-of-the-art HD/SD digital video cameras, prime lenses, matt boxes, tripods, Russian dollies, gibs, cranes, steady-cams, field monitors, portable and production lighting equipment, green screen, field audio equipment, mixers, microphones, portable DAT recorders, and multiple high-end HD/SD editing suites for post, FX, scrubbing, finishing and compositing CG. In short DXARTS is enviable by any national standards for digital film production. On the other hand, the primary creative practice of screen writing, directing, cinematography, lighting, location scouting, art direction, all must be fully developed and integrated for a generative cinema program to work, and DXARTS does these equal to any film school in the nation. In reality DXARTS is already the University's defacto digital cinema program, but it needs to be formalized, and resources added. To illustrate this point:

- DXARTS undergraduates have received 100 percent acceptance into prestigious graduate film schools including, AFI (in cinematography), NYU, Columbia, UCLA, Chapman, School of the Art Institute of Chicago, USC, CMU, and University of Illinois, Chicago.
- Four student groups in 2006 have received prestigious digital video awards this year alone for innovative work in the field, including; an \$25,000 MTV Incubator Award for a new broadband video series, an invitation to exhibit real-time digital video experiments in the exclusive Venice Architecture Biennale, sharing a prestigious SIGGRAPH award in haptic's and computer animation

with UW's Mechanical Engineering graduates, and a receiving a \$30,000 award to develop an artificially intelligent digital video art work for the celebrated Unknown Territories project located in the United Kingdom.

- Two students from 2005 DXARTS 451-3 video sequence were selected to Art Direct a feature length film *Brand on the Brain* from notable Canadian auteur, Guy Maddin. Maddin is considered to be one of the most original filmmakers in the world.
- DXARTS has been granted shared partnership with Global Classrooms of the Auditorium Space as a part of the SAFECO Tower purchase. This will allow for the creation of the finest HD digital cinema facility in the Northwest, encouraging both the highest quality research and scholarship in the field to be developed, and it will also support conferences, film festivals and other digital media enterprises to come to the University as partners in this growing field. DXARTS begun building with CSS a 75 seat native 1080p theater for presenting full resolution HD stereo cinema on campus.
- Shawn Brixey has been named to the Board of Directors for The Center for New Cinema (CNC) in Seattle, Washington. Anticipating and fostering the application of new technologies to experimental film making, CNC will project the future of cinema through groundbreaking film festivals, exhibitions, and commissions, premiering 2008.
- Three students from DXARTS digital video sequences received major Mary Gates Venture Grants and Fellowships for the creation of first film featurettes.
- DXARTS also saw past students have major professional success as well, recently completing large budget videos for the major label rock bands Queens of the Stone Age, Hoobastank, and The Killers, all of whom have skyrocketed to the top of the charts on MTV and Billboard.
- Six of the eleven films selected for the most recent Seattle International Student Film Festival were from DXARTS.

Primarily most film schools are studio technique schools, writing schools, or apprenticeship and industry connections schools. DXARTS on the other hand requires original research in digital video, electronics, software design, virtual reality, computer music, and computer programming, all of which is why our undergraduates have dominated the applicant pools of national film programs, and have had their pick of graduate film schools. We need not generate hundreds of low-level vocationally trained video students, but simply commit to a high-level and generative experimental digital cinema program where the graduates dominate the field. Our focus should be building the environment where pioneers such as Sergei Eisenstein, David Lynch, and The Lumiere Brothers would be nurtured and prepared to launch new digital cinema revolutions. The University cannot afford to squander its lead in this area, nor wait for another entity to do poorly what we do so well and compete with them down the road for the regional resources we can build today. We need to aggressively set out a strategic plan to build what DXARTS has placed easily in reach -- it only needs a green light and some small but realistic support to make it happen.

## 9.2. Collaboration | Dance and CHID

Two new joint-faculty positions are being sought by and further punctuate DXARTS' integration into the intellectual and academic fabric of the University. The developing partnerships emerge out of needs highlighted in each ten-year reviews and strategic plans of Dance and CHID citing DXARTS as the primary place for their growth and collaboration. The partnerships also dramatically reinforce the DXARTS/UIF originally planned collaborations, interdisciplinary hybridization, and diversity, which is at the core of these interactions. Beyond developing its own groundbreaking degree programs DXARTS has become a cornerstone for new fields of creative and scholarly research across the arts and humanities.

These requests are exciting new faculty positions in that they advance the UW as an international leader in digital culture invention and scholarship. They will catalyze deep collaboration with Dance and CHID creating a remarkable research and scholarship "troika." The positions further encourage progressive and transformative interaction among some of the most highly interdisciplinary units in the College, and provide an excellent model for other units seeking or needing similar re-structuring and re-alignment.

These joint positions will also provide better structured and ongoing access to each allied units' academic, human and technical resources, and they will also substantially increase the quality and total output of majors, enrollments, and graduation rates by streamlining course integration, and bridging critical gaps in novels ways. Finally, they will introduce substantial costs savings across the board in contrast to conventional modalities where each unit would be requesting multiple faculty positions, start-up funds, offices and research space to envision fulfilling the same needs and seeking the same successes.

The first faculty request is a joint DXARTS/CHID position seeking an embedded transdisciplinary historian, critic and scholar that will support the natural intellectual and creative bridge forming between the two hybrid disciplines and further strengthen the much needed critical and historical discussion surrounding the exploding nexus of art, science and technology.

The second faculty request is a joint Dance/DXARTS position focused on Dance and Interactive Performance Systems. The representation, hybridization and interaction with the body through technology is both an exciting, fertile and contested space that we believe must be investigated by leading digital arts and performing arts practitioners at the University of Washington. Dance and DXARTS seek to formally build off of the groundbreaking academic and performance collaboration -- *Dancing in the Digital Domain* -- they have recently completed and are running every two years, as well as the joint DXARTS/Dance Course run for the first time last spring. The position fulfills critical needs in Dance to partner with DXARTS as outlined in their 10 year review and strategic plan, as well as DXARTS' burgeoning needs to fully integrate movement and the body into our successful digital arts curriculum. This position request would formally be coming from both Dance and DXARTS so the importance, need, innovation and impact on the College and University can be fully understood and integrated into the position decisions.

### 9.2.1. Transdisciplinary Historian, Theorist, Critic | Art/Science/Technology

The rationale for embedding a shared historian, theorist and critic between DXARTS and CHID is as much evolutionary as it is revolutionary. It is not frivolous or wishful, nor is it a request born of base economics and convenience. It fulfills a deep and evolving need that was illuminated over the past five years by the natural cross-pollination both units require as a part of their interdisciplinary cultures. Interdisciplinary minds like those gravitating to CHID and DXARTS have a tendency to seek out parallel cultures of rigor that are both polymathematic, open and use similar processes of inquiry, regardless of the origin of disciplinary focus or the precise final outcome of its cultural products.

The faculty and students of DXARTS and CHID were unsurprised when a recent survey showed a substantial number of undergraduate DXARTS majors and non-majors enrolling in DXARTS courses were also CHID majors. This was always encouraged and envisioned but not strictly or pedagogically designed. It simply happened as a natural evolutionary outcome of interdisciplinary cross-pollination between the two dynamic programs. Further reflection showed that CHID students were now seeking new methods of inquiry, production and dialectical, being pioneered in DXARTS, and it also showed their interaction was influencing the shape of experimental art and critique being invented in DXARTS. The process was symbiotic in that these hybrid DXARTS students were then importing back into the CHID dialogue revolutionary new evidence and epistemologies surrounding the rapidly growing nexus of art, science and technology. Through the evolution of our shared student cohorts, we were observing tremendously provocative exchanges of ideas between our groups of faculty and students. We believe that we are witnessing a "tipping point," a moment in the history of ideas such that will delineate the boundaries of eras past and future.

Parallel to naturally occurring student revolution between the two units, the faculty from CHID had begun to investigate the means as well as the content of cultural expression. In doing so, they had also begun to focus more on the history and theory of digital and experimental art. However, none of the faculty in the CHID program has studio experience or formal training in the Arts or Art History. In a recently completed self-review, faculty members in CHID recognized the need to incorporate more faculty with training in the digital arts and art history. We in DXARTS and CHID envision that this position will fill this need as well as act as a generator for new teaching and research opportunities. Many CHID students now want to incorporate digital and experimental art as a component of their required senior thesis. The faculty member hired for this position would be perfectly suited to help students bridge this process as an integration into DXARTS, while maintaining the academic rigor and creative that has been



a hallmark of the CHID program. The CHID faculty also envision this new member would work closely with Phillip Thurtle in his recent work investigating the history of experimental music. Hopefully a working collaboration would develop that could lead to expanded team taught classes, joint grant writing, and co-authored articles.

All forms of discovery are the product of complex relationships and discursive exchanges of ideas in which actors, often with highly vested interests, compete and negotiate for resources, semantic meaning, and historical significance. Similarly, new interpretive methods and discursive strategies are required to theorize, describe, and historicize the transdisciplinary practices of DXARTS and the larger products generated by the growing fields of digital and experimental arts. If the fruits of DXARTS research are substantially hybridized practices integrating art, performance, science, scholarship and engineering, then one must wonder about the epistemological and ontological status of these hybrid forms: What exactly are they? What new kinds of Arts and Sciences knowledge do they produce or enable? What is their hybrid function in the world? How will they come to be known and what cultural meaning will be projected onto them now and in the future?

Clearly this is not simply a search for an art historian. Art historians rarely have the broad combination of contemporary scientific, theoretical and digital arts focus needed to analyze and critique this new art. Nor is it a search for a traditional art or media science theorist, their knowledge and practice, while possibly closer still, is lacking in the language of production, where they could as easily read a revolutionary passage in a line of computer programming code, as they could make connections between the diverse forms of historical practice that are the foundation of these new forms of art. This position is a true hybrid.

It is at this powerful juncture the DXARTS and CHID programs seek a joint tenure-track position for a Transdisciplinary Historian, Theorist and Critic whose research and teaching focus is on the nexus of contemporary Art, Science, and Technology. The ideal candidate's research and teaching would grapple with the epistemological and ontological questions raised by hybrid arts/science/technology collaborative practices. The candidate would be technically literate and highly comfortable working with digital experimental artists, scholars, engineers, and scientists, and will be equally adept at discussing history, analyzing contemporary practice, and envisioning the future. This professorship would add humanistic rigor and insight to the DXARTS Ph.D. and B.F.A. programs through specialized scholarly research, while strengthening the practicum CHID students now want, and supporting the historical, critical and theoretical aspects of the CHID curriculum by placing a faculty precisely at the emerging intersection of the hybrid cultures. While what we are requesting is indeed revolutionary for DXARTS, CHID and the University of Washington. The University of California, San Diego has an entire College (The Sixth College) whose focus is precisely on these areas we are describing and seek to further pioneer.

Our vision, simply stated, is to take our two unique yet similarly rigorous research cultures and encourage a formidable synthetic blend of scholarship and generative practice to emerge. As has been noted, DXARTS has successfully recruited truly world class faculty who would not have come to the UW other than to be integral to the DXARTS program. In addition it is clear that units such as CHID, School of Art (Design), Music (viola) have recruited faculty by using the possibility of collaboration with DXARTS as a substantial lure. This position is important in many ways. The scholar will work closely with faculty and students to develop: 1) a broad perspective on the history and current practice of the digital and experimental arts; 2) a methodology for evaluating the hybrid processes and boundary objects produced by the field; and 3) a language for praise, criticism, understanding and articulation of its implications and applications.

The primary duties and housing of the new hire will be in the Center for Digital Arts and Experimental Media (DXARTS) with responsibilities divided between DXARTS and CHID as 75 percent/25 percent respectively. Teaching and research will be in a variety of History, Theory, and Criticism located at the nexus of Art, Science and Technology developed between the DXARTS and CHID. This will also include chairing thesis committees for CHID and chairing doctoral student committees in Digital Arts. The teaching load for this position will be five courses per academic year.

### 9.2.2. Dance and Interactive Performance Systems

The Dance Field has witnessed tremendous growth and change in the last decade, and since the creation of the University of Washington's nationally recognized M.F.A. program in dance. A major catalyst for

transformation has been a growing interest in, and demand for, interdisciplinary approaches to theorizing and practicing dance performance. The introduction of new interactive media and digital technology has profoundly impacted how we conceive of dance praxis and the creation of new work, leading to a new area of the discipline—Dance Technology. One of the most exciting aspects of Dance Technology is that it calls for a new emphasis on collaboratively conceived and constructed art—a process that demands the removal of traditional disciplinary boundaries and the creation of new domains of art making.

The joint Dance and DXARTS faculty position request focuses on Dance and Interactive Performance Systems. The representation, hybridization and interaction with the body through technology is both an exciting, fertile and contested space that we believe must be investigated by leading digital arts and performing arts practitioners at the University of Washington. In 2005, Ph.D. students from DXARTS collaborated with M.F.A. students in Dance in the creation of new, digitally mediated choreography that was produced in the Dancing in the Digital Domain concert. Dance and DXARTS view this as a strong, rational and highly successful beginning to an on-going and deepening partnership and seek to formally build off of this groundbreaking academic and performance collaboration.

A crucial step in cementing the growing partnership is by providing the fulltime faculty support and curricular infrastructure to allow for a profound engagement with emerging technologies as applied to movement-based performance. Within dance, our peers at the University of Utah, ASU, UC-Irvine, OSU, University of Michigan-Madison, and University of Texas-Austin already have programs and faculty lines dedicated to new performance technologies. In seeking this additional position in Dance and DXARTS, we strive to not only keep abreast of changes in the field, but also be at the forefront of conducting research in these emerging technologies and practices. The position fulfills critical needs in Dance to partner with DXARTS as outlined in their ten year review and strategic plan. And it clearly supports early data from DXARTS punctuating student and faculty demand for this area to be developed, as well as meets DXARTS burgeoning needs to fully integrate movement and the body into their successful digital arts curriculum.

The individual in this Dance and Interactive Performance Systems position would: 1) teach hybrid Dance and Interactive Performance Systems courses to students in Dance, DXARTS and other arts/performance disciplines, and; 2) serve as artistic director and liaison to the technical director of the biennial Dancing in the Digital Domain collaborative concert, as well as; 3) develop interdisciplinary coursework that will pioneer the investigation and interrogation of the technical, practical, conceptual, and theoretical domains of new performance technologies and support students' most imaginative artistic visions.

The primary duties and housing of the new hire will be in Dance, with responsibilities divided between DXARTS and CHID as 50 percent/50 percent respectively. Teaching and research will be in a variety of Dance and Interactive Performance Systems developed between the DXARTS and Dance. This will also include chairing thesis committees for Dance and chairing doctoral student committees in Digital Arts. The teaching load for this position will be five courses per academic year.

### 9.3. Development | Endowed Professorships

With the unlikely benefit of new resources and numerous faculty lines being added to ease the pressure on the Program, DXARTS seeks a realistic development support commitment from The Office of the Provost, and the Office of Development to find external donors committed to creating a ground-breaking new set of Endowed Professorships in Experimental Digital Video and Computer Music. The Endowed Professorships will be housed in one of the campuses most exciting and celebrated interdisciplinary programs, DXARTS. The positions will ingeniously serve a growing campus need by synergistically anchoring the nation's premiere research innovations in this field already occurring in DXARTS, more closely aligning itself to take advantage of major regional community investments in film, video, scientific and medical imaging and music technology infrastructure such as SIFF, Jack Straw, and the Vera Project, and most importantly catalyze an aggressive pioneering nexus of interdisciplinary digital video and audio research across campus.

The Endowed Professorships are envisioned as a biennially cycled set of distinguished positions touching all interdisciplinary fields of digital video and audio experimentation from narrative film, and computer animation, to motion capture for dance, audio wave front synthesis, computer music composition, scientific and medical imaging, artificial intelligence and machine vision. The revolutionary new

professorships will build their concentration around inter-college joint appointments, and will rotate their focus every two years allowing for a sophisticated titrating of research, cross-college collaboration and integrated pedagogy to emerge. The positions allow for the University to capitalize on DXARTS' strengths in this field, while elegantly broadening its highly successful interdisciplinary research, educational and outreach models to include a sophisticated array of major campus programs with deep investment and need in this area. DXARTS' highly respected faculty and organizational structure provide the needed creative leadership to recruit, accelerate, focus, and innovate in a field of lightning fast developments that are beginning to affect nearly every aspect of digital arts and sciences research. DXARTS also has commitments of support from two MacArthur Fellows in these fields to use their names for securing the funding for the Professorships and as well their distinguished careers to bring their knowledge and prestige to the enterprise.

While DXARTS engages in pioneering research, as well as provides access to state-of-the-art access courses, tools and labs, its highly limited faculty resources do not allow for it to more aggressively and innovatively tie together the rapidly growing university experiments in the field. These Endowed Professorships would be wholly unique, provide for a recapture of current salary to soften the impact of under-funding, and make this opportunity a natural extension for all the campus programs involved in these area as well as logical "tipping point" in the Provost's focus on truly interdisciplinary initiatives.

#### 9.4. Horizons | IGERT EE/CSE

DXARTS will be embarking on numerous new horizons next year including two major NSF initiatives. The first NSF initiative will be a two College, three program collaboration that includes faculty and doctoral students from DXARTS, Electrical Engineering and Computer Science to develop a joint NSF IGERT proposal that supports the establishment of a revolutionary arts, sciences and engineering graduate research and training program within the emerging field of embedded and interactive performance systems.

The convergence of digital video, simulation, sensing and control systems, haptics, motion capture, computing, and wireless communication has created new and exciting opportunities in science, engineering, and the arts. The type of significant development needed for major breakthroughs in this field requires a fully cross-disciplinary endeavor, one that necessitates collaboration between students and faculty from the broadest spectrum of backgrounds and perspectives, including Computer Science, Electrical and Computer Engineering, Psychology, Physiology, Design, Composition, and Performance and Digital Arts. Areas of focus for research and education include rapidly customizable and modular tools that integrate digital video and audio, motion tracking, haptics, networking, human-computer interaction, computer graphics and visualization. The graduate training program will emphasize synthesizing rigorous technical knowledge across several of these emerging areas, as well as developing hands on experimental research of hybrid and embedded interactive systems in real-world environments. All of these will bring together small interdisciplinary teams of researchers with diverse expertise. The IGERT-supported program will leverage existing strengths that exist only at UW. The program will complement the EE, CSE and DXARTS' Ph.D. programs by enabling the nation's only cohort of doctoral students from digital and experimental arts, computer science and engineering departments to collaboratively pioneer important and useful research in the field.

The second NSF proposal is a DXARTS independent ISE that uses the unique status of the creative and technical disciplines of digital and experimental arts research (hybrid arts and sciences practitioners) to explore, develop and implement broad new informal learning experiences (such as art, science and technology exhibitions) designed to increase interest, engagement, and understanding of science, technology, engineering, and mathematics (STEM) by individuals of all ages and backgrounds. The DXARTS ISE projects will target large public audiences, exhibitions, stage performances, and professionals whose work directly affects informal STEM learning. DXARTS ISE research will focus heavily on the strategic impact of digital and experimental arts disciplines stimulating future innovation and collaboration with science, technology, engineering, and mathematics disciplines.