Network for Science, Engineering, Arts and Design
Annual Report summary, Carol LaFayette, PI, May 2012

Introduction

The National Science Foundation Computer, Information Systems and Engineering directorate Intelligent Systems division (CISE IIS) sponsored three workshops in FY11 bringing together artists, scientists and engineers from across the United States to address needs of the burgeoning community of researchers and research practices that bridge Computer Science, Engineering and Creativity:

The first workshop, Re/Search: Art, Science, and Information Technology, was co-sponsored with the National Endowment for the Arts and held at NSF headquarters, September 2010. This workshop convened a group of sixty stakeholders in a highly interactive forum to discuss a broad range of topics about interdisciplinary research and pedagogy connecting the arts and sciences.

The second NSF sponsored workshop, Bridging STEM to STEAM: Developing New Frameworks for Art-Science-Design Pedagogy, was held at the Rhode Island School of Design, January 2011. This workshop focused on the ways that teaching and learning in the arts and sciences can benefit from increased collaborations and understanding of synergies among diverse disciplinary concepts and methods.

The third workshop, Establishing a Network of Excellence for Art + Science + Technology, was held at the Experimental Media and Performing Arts Center at Rensselaer Polytechnic Institute (RPI), March 2011. This workshop addressed issues of creating and sustaining interdisciplinary research networks, bridging creative practices to research practices that are supported by the NSF CISE directorate.

The workshop at RPI was the genesis of two working groups, now continuing efforts toward formalizing the results of the three meetings. The first group is studying the research community and performing a needs assessment for a digital archive and resource for stakeholder researchers and educators, hereafter called the "Virtual eXchange to Support Networks of Creativity and Innovation amongst Science, Engineering, Arts and Design (XSEAD)." [Rikakis et al., 2011]. The second group, represented in this project, is forming the pilot for a national network that includes innovative methods for connecting and supporting this research community across academia, non-profit organizations, industry, and funders, called "Network for Science, Engineering, Arts and Design (NSEAD)." [LaFayette et al., 2011]

NSEAD leveraged the successes of the former NSF CreativeIT program and its transformative research trajectories by hosting two workshops that resulted in formation of a pilot network, titled SEAD.

The first NSEAD workshop was hosted by collaborative partner and Co-PI Carol Strohecker, Director, Center for Design Innovation, University of North Carolina system, at its headquarters in

Winston Salem, September 31 - October 1, 2011. This workshop brought together a national community of stakeholders to explore models for organizational structure and process, and develop a vision to serve larger sustainability objectives. Invitees included academics, researchers, and industry representatives who participated in former NSF sponsored workshops, members of XSEAD, representatives of federal funding agencies, and professionals representing important cultural movements in 21st century research and pedagogy, such as those in the "Do-It-Yourself" (DIY) community of "makers." Meeting facilitator Steven Wright, Grove Consulting International, provided graphic facilitation of proceedings.

The second NSEAD workshop was hosted by collaborative partner and Co-PI Gunalan Nadarajan, Vice Provost, Research and Graduate Studies, Maryland Institute College of Art, November 14 - 15, 2011. This workshop, composed of many of the same participants from CDI, developed vision, mission, goals, and long to short term objectives for the pilot network. Steven Wright again facilitated and provided graphic recording.

This network to support science, arts, engineering and design collaborations that engage new forms of computational thinking will become a focal point for innovation, pooling of resources, and cross-pollination to support transformative initiatives that are possible only through combining expertise from diverse knowledge domains. In recent decades such achievements have emerged vibrantly through the rapid evolution of computer technologies. The work of materials scientists and electrical engineers combined to bring silicon into circuitry and to combine insights relating natural and fabricated systems [Iwai and Ohmi, 2002]. Inheriting from predecessors in cybernetics, Seymour Papert wove mathematics with Jean Piaget's developmental psychology into a particular discipline of artificial intelligence, further combining John Dewey's theories of learning to recommend transformations of educational systems [Minsky and Papert, 1969; Papert, 1988; Papert, 1980; Papert, 1999]. Alan Kay extended his fascination with Ivan Sutherland's Sketchpad and implications for computer graphics by incorporating insights from psychological theories [Kay, 1993]; the work of Karl Jung inspired representational strategies underlying graphical, icon-based displays [Reisman, 1994]; the work of Jerome Bruner informed development of educational software such as Smalltalk and Squeak [Barnes, 2007].

As physicists and engineers developed x-ray, telescopic, stroboscopic, holographic and other imaging techniques, visual artists experimented with the new expressive potentials they enabled [Frankel, 2002; Neil, 2010]. In turn these artists often influenced the development of the technologies, as well as advances in other disciplines such as architecture and computer science [Haase, 2000]. Visual artists and musicians created computer languages and algorithms while pushing technologies for composing and recording in fields of software engineering, artificial intelligence, graphics and visualization. [Wilson, 2002; Dabby, 2008]. An entire ecosystem of academic programs, research conferences, gallery exhibits, museum programs and municipal events has emerged through such lively inquiries [Brown University, 2010]. Nevertheless, researchers and practitioners attempting to work across disciplines of the arts, sciences and technology often encounter barriers [Grove, 2010]. Within disciplines, purists may question the depth or validity of the work. Members of collaborating disciplines may feel undervalued or misunderstood. Institutions such as universities may not have ways to ascertain, evaluate or acknowledge the merit of individuals' contributions. Members of the public may not have the

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literacies to appreciate the value and potentials of outcomes. A network structure would provide the means to address such barriers in order to enable effective transdisciplinary collaboration.

Pilot network model

A focus on sustainable funding and support is reinforced through the structure of the pilot organization developed from the two NSEAD workshops: a distributed model of node institutions is in formation, with cross-institutional working groups self-selecting areas for development:

- Research community development
- Collaboration and project facilitation
- Large-scale inter-instructional collaborations
- Forums to share best practices in "PK to gray" learning in formal and informal settings
- Philanthropic opportunities for public and private funding organizations
- Expertise referrals

Long-term fiscal sustainability is a critical concern. We considered examples of for-profit, nonprofit and hybrid support models, including partnerships with federal agencies, private foundations, industry sponsorships and inter-institutional collaborations. We were particularly interested in discussing how innovative economic models such as microfunding, knowledge transfer, and social networking can be harnessed to support network activities.

Outcomes of our work to date include:

- Formation of collaborative working groups among U.S academic institutions and private partners to develop short term initiatives, detailed below
- An online site to collect and disseminate information about network history, people, institutions, opportunities and activities
- Graphic documentation of proceedings from the two workshops
- A benchmarking exercise of similar organizations to focus on unique contributions
- A demographic study of the stakeholder group to gain an understanding of fields represented
- Support and coordination for initial organization of working groups
- A poster announcing the network, published at SIGGRAPH, August 2012, Los Angeles
- A bibliography of third party papers related to cross-disciplinary collaborative research and practice, to develop an overview of needs, opportunities, and recommendations
- A database of SEAD-related conferences for 2012 and 2013 to target audiences for dissemination of white papers and other completed work

To reinforce the cross-pollination between XSEAD and NSEAD, and to avoid conflicts with another prominent organization with the same acronym, the network title is SEAD**.** The network has officially adopted the acronym SEAD for the future. http://sead.viz.tamu.edu

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Exploring network models

Prior to workshop one, we explored network models of physical, virtual and blended organizational structures. We examined three organizations most closely aligned with our current stakeholders: Center for Innovative Learning Technologies (CILT), Center for Advancement of Informal Science Education (CAISE), and Graphisme, Animation, et Nouveaux Médias, (GRAND NCE). These organizations suggested three different general structures to compare: 1) Top down and bottom up; 2) Theme based; and 3) Project based. Wireframe models were developed for greatest contrast and were not meant to exactly parallel the example organizations we studied.

Criteria for evaluation included 1) Facilitates visionary (not just service) leadership; 2) Adapts to change for sustainability and long term growth; 3) Collaborative, cross- and inter-disciplinary work is fundamental; and 4) Provides individual incentive for participation (leadership, members, new members, new leaders). For detailed information on the study, see this document.

Overview of comparisons

Michael Lord, Ph.D.

Key Model Dimensions to Consider
Consider the benefits & disadvantages, rewards & costs of Centralization & Integration vs. Decentralization, Autonomy, Specialization

Top Down and Bottom Up Model
- More centralized & integrated
- Large, nebulous, ponderous?

Theme/Constituency Model
- More autonomy, coherence
- But whither "synergy"?

Project-oriented Model
- Most decentralized & specialized
- Disparate & disconnected?

Intellectual Capital and Intellectual Property
- Open
- Open and/or free to all, "crowdsourced"
- Who contributes, "owns" & controls what?

Semi-open
- "Members only," membership has benefits--and costs
- Too exclusionary, too (institutional/corporate) "elitist"?

Closed, proprietary
- Specific contributions & contracts, assignment & ownership
- Closed, constraining, whither the "public good"?

Resource Acquisition and Allocation: $ In & Out

Membership
- e.g., good fit for Leadership Model?
- Individual membership
- Organizational/Institutional membership

Grants & Sponsorship
- e.g., good fit for Theme/Constituency Model?
- More attractive to interested external sponsors

Project Funding
- e.g., good fit for Project Model?
- Most attractive to specific external funders

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Field building challenge
One question repeated in workshops was that of of whether there is a need to focus on building a field from many fields ("a field of fields"). Some discussed the depth of discipline to be a major contributor to robust and impactful cross-disciplinary work. Others expressed the desire to do away with traditional definitions in pursuit of a new, integrated field. Our interviews revealed field building activities within CAISE especially, with advice that to identify a field is a very long term proposition. An organization needs time together, commitment, and trust. It's a challenge to create recognition, and is a never-ending process.

Corporate and blended partnership challenges
Our studies of other organizations revealed lessons to learn from partnerships between academic and corporate groups. There is a need to plan for time frames with project work that might span more than one academic quarter or semester. Alignment of industry and research objectives must be considered. There is need for mutual education in terms of goals, methods, and policies. Mutual incentives for researchers and corporate partners should be built into the plan. A network might have limited ability to "enforce" or "broker" collaboration within projects.

Partnerships are most productive with corporate research and development teams rather than with the company's educational arm. CILT states, "Prior evaluations of productive partnerships between research and industry found that the most effective partnerships were based on a true collaboration model: the more effort that an industry partner puts into the partnership, the more benefits that partner will receive....[We] steered away from models that provided surface contact between industry and educational research, but without significant collaboration. Specifically, [we] stayed away from industry's philanthropic institutions that do not influence corporate strategy." [CILT, 2004]

Blended partnership challenges include the need to develop mechanisms to bring industry and other receptor communities (NGOs, Goernment and nonprofit agencies) to the table and into projects early, often, and in a way that provides real synergy for the best possible outcome.

Benchmarking organizations
Prior to the second workshop, we referenced Grove graphic records to construct vision, mission, and goal statements to serve as a straw document for vetting. We also benchmarked seventeen organizations with similarities to the planned pilot. This provided clear directions as to how the proposed network might position itself for a set of unique contributions.

Two different groupings were studied: organizations with similar stakeholders, and those with different stakeholders but with similar elements of interest, for example, a focus on matchmaking, collaboration across disciplines, and distributed leadership. By reviewing these organizations' missions and activities, common criteria was developed to compare. For a detailed spreadsheet, see this document.

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	1. NSEAD like organizations									2. Structually interesting but not focused on the same stakeholders					
	Leonardo	ISEA	Ars	Rhizome	GRAND NCE Canada	SIGGRAPH	Arts Catalyst	Artists in Labs	Creative IT Wiki	CAISE	Harvard Catalyst	NCT	Vivoweb	Open Invention Network	FEAST
	1	1	1	1	1	1	1	1	1	1a	2	2	2	2	2
Mission		ISEA Intern	Ars Electr	Rhizome is	Our Vision				This wiki is	Our vision is	Harvard Catalyst	NCN is a	The nationa	Open Invention	FEAST (Fundin
Field articulation	✔				✔					✔		✔			
Matchmaking	✔				✔			✔		✔	✔	✔	✔		✔
Dissemination	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
Policy change					✔						✔				
STEAM educational initiatives							✔								
Bridge communities	✔	✔			✔		✔	✔	✔	✔	✔				✔
Foster future leaders		✔			✔	✔	✔		✔	✔	✔	✔			
Innovation and economic development			✔		✔							✔		✔	✔
Ties to commercial industries			✔		✔	✔				✔		✔		✔	
Inernational focus	✔	✔	✔	✔		✔	✔					✔		✔	
Rolling leadership		✔				✔				✔					
Nonacademic communities	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔			✔	✔
Underrepresented groups		✔			✔	✔	✔		✔	✔					✔
Advisory committee or board of directors	✔	✔		✔	✔	✔	✔			✔	✔	✔			
Fee membership	✔	✔		✔		✔									
Benchmarking here addresses whether or not the topic is part of the goals or initiatives of the organization and not whether they occur as a result of other goals or initiatives.															

Benchmarking similar organizations

In benchmarking, we discovered all but one we studied focus on dissemination of work, and only two are involved in advocacy and policy change. It was agreed the pilot network would adopt advocacy as a key vision. There was a near absent emphasis on the initiative with the moniker of STEAM (Science, Technology, Engineering, Arts and Math), pioneered by those such as John Maeda of RISD, and the subject of a related, 2010 workshop. The pilot network thus created an initiative to explore advocacy for integration of SEAD in educational arenas.

Out of nine organizations that attract similar stakeholders, only two focus on innovation and economic development. This became a SEAD goal area. Only three engage in some form of matchmaking for members. A plan to incorporate matchmaking was included in a design meeting with the XSEAD portal group in January 2012, University of Arizona, Tempe.

To provide continuity, participation in workshop two was strongly elicited from those who attended workshop one. On the first day we distributed documentation of the prior meeting from Grove graphic records and the benchmarking exercise. Participants then agreed on preliminary vision, mission, and goal statements. On the second day smaller working groups developed long and short term goals with milestones and target dates. XSEAD PI Thanassis Rikakis presented an update on the schedule for portal development.

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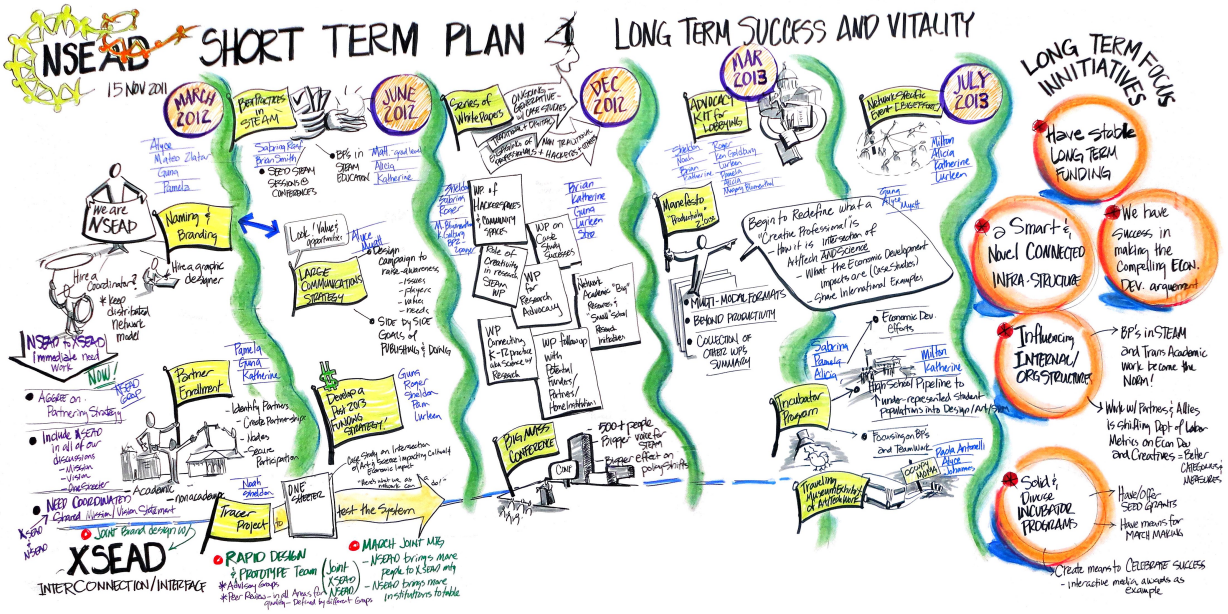

NSEAD Goals and milestones, from workshop two, MICA (Steven Wright, Grove Consulting)

Resulting pilot network structure

It was decided among the participant group that the pilot network would best function as a distributed organization, similar to the "constituencies and themes" model above. Four areas emerged, described below, that serve as loci for self aggregation of working groups distributed across the country. On the second workshop day, guiding metaphors were developed to describe how this might play out in ideal and real ways. With collaboration as a core value, the network is resourced by individual and collective incentive of participants to develop short term initiatives, with a view to how they serve long term goals. In the coming year we will pursue a formal board of advisors and networked leadership hubs.

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Vision, mission, goals and objectives

After the two workshops were concluded, the group further refined the following consensus document that will serve the pilot network. We acknowledge the need to revisit and revise these statements periodically.

Network for Sciences, Engineering, Arts and Design (SEAD)

Vision

We will become the leading advocate for collaboration among the sciences, engineering, arts and design, fostering innovation and learning that impact community sustainability and economic growth

Mission

We operate in entrepreneurial, sustainable ways to identify and promote broader impacts for communities and individuals in new areas of practice, research and critical discourse achieving creative excellence and intellectual merit.

Goals

Advocacy for research and creative work

The network facilitates experimentation with new methods, materials, and modes of creative inquiry and understanding in order to spawn groundbreaking discoveries and inventions.

Advocacy for learning and education

The network promotes life-long learning by supporting topics, pedagogies, and evaluation methods that integrate the sciences, engineering, arts and design.

Advocacy for partnerships

The network is a nexus for strategic partnerships among individuals and organizations including government, industry, civic and academic institutions fostering initiatives that bring together diverse disciplines and domains.

Advocacy for culture and economic development

The network champions partnerships that value sustainability, community development and social entrepreneurship, in order to spur economic growth.

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Short term objectives overview

Work to July 2013
For detail on long and short term objectives, email Carol LaFayette

XSEAD linkages

Chair, Sheldon Brown, Professor of Visual Arts; Director, Arthur C. Clarke Center for Human Imagination; Founder, New Media Arts for the California Institute of Telecommunications and Information Technologies (CalIt2); University of California, San Diego

Co-Chair Alicia Gibb, Research and Development Lab Director, BugLabs, New York; Entrepreneur

To create crossover linkages among NSEAD and XSEAD, two NSEAD workshop participants will serve on the Curatorial Board of XSEAD to help develop of a section focused on quality examples of collaborative projects. Sheldon Brown, representing a major academic research facility and Alicia Gibb, representing the "DIY and Maker" community (Buglabs, NY), will work with XSEAD PI Thanassis Rikakis on this objective.

Learning and education

Best practices working group

Chair, Brian K. Smith, Dean, Continuing Education, Rhode Island School of Design

Co-Chair, Katherine Moriwaki, Assistant Professor of Media Design; School of Art, Media and Technology; Parsons the New School for Design

Assistance: Alicia Gibb, Buglabs NY; Tracy Hammond, Director, Sketch Recognition Lab; Associate Professor, Department of Computer Science and Engineering; Texas A&M University

One major area of focus is that of addressing the integration of SEAD curriculum in lifelong learning and education. This involves developing models for best practices and sharing of curriculum across U.S. academic institutions. To raise awareness of the need for cross-disciplinary integration, another objective is to develop position papers for presentation at organizational conferences. Others include attending congressional hearings within the Department of Education to address policies; forging partnerships between universities and community hacker spaces; clarifying pedagogical strategies and best practices for SEAD informal and formal learning; and rethinking the distinction between Art and Science departments in educational institutions.

High school pipeline to underrepresented student populations

Chair Tracy Hammond, Texas A&M University

Co-chair Sheldon Brown, University of California, San Diego

Assistance: Alicia Gibb, BugLabs, New York; Katherine Moriwaki, Parsons the New School for Design

This objective is to develop a SEAD educational initiative for K-12 students to be shared across academic institutions. Its purpose is to mentor those in under-represented populations for entry

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into career fields in science, engineering, arts, and design. Some factors to address include the definition of a STEM career in relation to fields that don't always "count," such as 3D animation and game design. Likewise, artistic fields need to include math and science as foundational for a career in digital media production. Defining an "at risk" student involves gaining knowledge of those who may not enter STEM careers but be ideal candidates. U.S. educational institutions are more successful at producing managers but less so manufacturers or creators. Skills such as soldering and 3D printing are among those needed for the future.

Research and creative work

White papers working group

Steering committee in progress to invite international representation

Chair, Roger Malina, Distinguished Professor, Arts & Technology, University of Texas, Dallas; Professor, Aix Marseille University; Leonardo/ISAST Chair Emeritus; Leonardo Governing Board Member

Co-Chair Carol Strohecker, Director, Center for Design Innovation, University of North Carolina system; Professor, Winston-Salem State University; Chief Research Officer, Instructor, UNC School of the Arts

Steering Committee
Ken Goldberg, Professor, Industrial Engineering and Operations Research jointly with Electrical Engineering and Computer Science; School of Information, University of California, Berkeley
Marjory Blumenthal, Associate Provost, Academic, Georgetown University
Adriene Jenik, XSEAD advisor, Professor and Director, School of Art, Katherine K. Herberger Endowed Chair in Fine Arts, Herberger Institute for Design and the Arts, Arizona State University
Shawn Brixey, XSEAD Co-PI, Director, DXArts, University of Washington
Donna Cox, XSEAD Co-PI, Professor, The National Center for Supercomputing Applications (NCSA), located at the University of Illinois at Urbana-Champaign, Director, Illinois eDREAM Institute
Jonas Braasch, XSEAD Co-PI, Assistant Professor, School of Architecture, Communication Acoustics and Aural Architecture Research Laboratory (CA3RL), School of Architecture, Rensselaer Polytechnic Institute, Troy, New York
Pamela Jennings, Director, Brenda and Earl Shapiro Centers for Research and Collaboration; School of the Art Institute of Chicago
Gunalan Nadarajan, Dean and Professor, School of Art and Design, University of Michigan

This objective addresses the need to raise awareness of the impacts, values, opportunities and challenges of cross-disciplinary research and creative work. Following on a vision initiative first developed in the 2010 Alexandria workshop cited above, a White Papers Working Group was formed to issue an open call for papers, to result in a published compendium. This compendium is envisioned to take a form similar to the 2003 publication "Beyond Productivity: Information, Technology, Innovation, and Creativity," edited by William J. Mitchell, Alan S. Inouye, and Marjory S. Blumenthal, Committee on Information Technology and Creativity, National Research Council. [Mitchell et. al., 2003] White papers will be targeted for selected conferences in 2013 and published online. The group is also developing a bibliography of SEAD related, third party white papers for a meta-view of needs, opportunities and recommendations.

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Culture and economic development

Incubator program: economic development; toolkits; best practices and teamwork
Team in development.

CoChair: Pamela Jennings, School of the Art Institute of Chicago

In service to the country, this goal involves articulating the impact of transdisciplinary skills on culture, innovation, and economic development. There is potential to build a brand with credibility and trust; to identify unique opportunities that merit community support; to develop "incubator" programs with toolkits, best practices, and strategies for team building. Such an initiative could result in workforce development; support for community spaces rural to urban; and new models for intellectual property policy and technology transfer. Designed to be accessible to the general public, the network can foster recognition in the form of awards and challenge projects; and facilitate affinity building in communities. Target support groups would consist of academic policy makers and community leaders joining together to nurture and mentor the next generation.

Partnerships

Partner enrollment and advocacy in agencies
Chair, Gunalan Nadarajan, University of Michigan

This objective will serve the goal of identifying partners for the network, for example The American Association for the Advancement of Science, American Institute of Electrical and Electronics Engineers, College Art Association, International Graphic Association for Computing Machinery, American Institute of Graphic Arts, and others. There is potential to broker partnerships, programs and conferences among network members and institutions. A communications rationale and protocol should be developed. This group would become the voice of the network by facilitating and explaining the value of partnerships across communities and disciplines. One objective would be development of an advocacy kit for best practices.

Stakeholders

Stakeholders include creators, funders, facilitators, and partners. SEAD will work to balance its population across disciplines. It will invite those who will benefit from the value this community offers and bring potential partners into initiatives in early stages.

Documentation and resource sharing

SEAD's online presence includes:
About the network, foundational partners and institutions, history, references
News spotlights and recent events
Calls and employment opportunities
How to join the NSEAD list serve
Project pages for working groups

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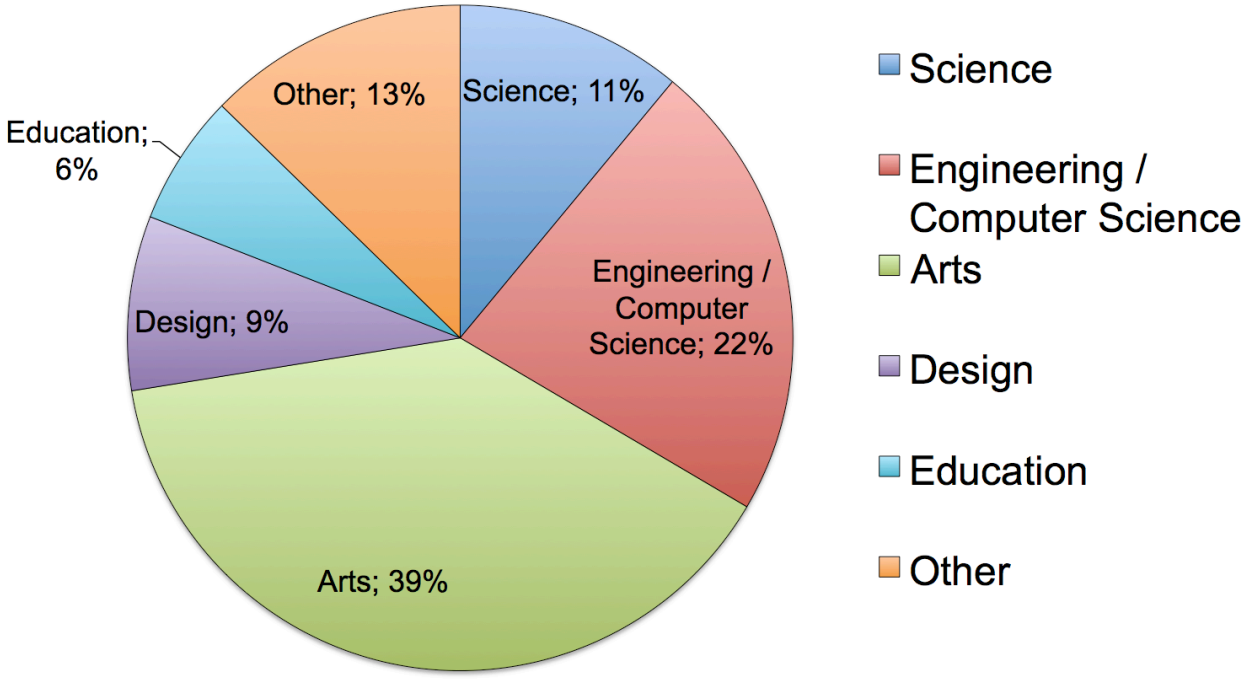
Demographics

Following up on GRAND's demographics study mentioned above, we were interested to know the balance in the stakeholder group with respect to discipline. We researched demographics of 151 individuals who attended at least one workshop relating to cross-disciplinary engagement amongst arts, sciences, engineering and design. Including the two NSEAD workshops, the survey also covered the three aforementioned, NSF sponsored meetings in 2010-2011.

Across all workshops, out of 296 invited, 151 attended at least one workshop (51%). We listed participants by highest degree earned and research/practice area. A slight majority of those in the arts (39%) is closely followed by those in Engineering and Computer Science (22%); followed by Other (13%), Science (11%), Design (9%), and Education (6%).

As a result of this study we have begun to pursue forms of outreach to balance participation, especially by those in scientific disciplines. A working group was formed to plan ways to more effectively attract individual scientists and scientific groups (Roger Malina and Co-PI Carol Strohecker). Co-PI Gunalan Nadarajan presented a talk for over 100 enthusiastic attendees at the 2012 annual conference for The Association for the Advancement of Science, and will again present at the 2013 conference. We continue to explore ways to balance the network across all areas.



This chart shows the demographic makeup of all those attending meetings from Alexandria, 2010, to Baltimore, 2012.

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Demographics Detail

Total attending: 151

By discipline

Science
Biology
Cognitive Science
Ecology
Immunology
Integrative Biology
Maritime Systems
Marine Science
Mathematics
Medicine
Medical Illustration
Physics
Zoology

Engineering
Aerospace Engineering
Applied Mathematics
Computational Design and Interactive systems
Computer Applications
Computer Science
Computer Science and Engineering
Computer and Information Science
Cybernetic Systems
Electrical Engineering
Engineering
Engineering Physics
Human Centered Systems Design

Arts
Advanced Visual Studies
Art and Technology
Art History
Cinema-Television Production
Computer Art
Computer-Based Music
Electronic Arts
Experimental Media
Film and Art History
Film/Animation/Video
Fine Arts
Music
Liberal Arts
Media
Media Arts and Sciences
Music Composition
Music Composition for Screen
Music and Technology
Musicology
New Forms and Concepts Performance, and Musicology
Philosophy of Art
Psychoacoustics
Radio, Television, and Film
Sculpture
Studio Art
Theater Arts
Visual Studies
Visual Studies and Environmental Art

Design
Apparel Design
Architecture
Architecture, Art, and Planning
Computer Graphics Arts
Industrial Design
Interior Architecture
Interventions and Adaptive Reuse
Landscape Design
Design Science
Graphic Design
Industrial Design

Education
Computing and Education
Communications
Education in Mathematics, Science and Technology
Learning Sciences
Museum Education
Music Education
Teaching in Science
Teaching in Biology
Special Education

Other
Communications
Cultural Studies
Developmental Psychology
Human factors
Information Science
International Politics
Library science
Linguistics
Literature and Technology
Philosophy
Psycholinguistics
Political Science
Science Journalism
Sociology
Urban Studies and Planning

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Summary
The SEAD network creates continuity for earlier efforts to formally recognize the value and potential of cross-disciplinary research and practice among SEAD disciplines. It provides a framework to bolster a diverse group of individuals spanning public, private, and civic entities.

In our workshops, we heard it said more than once that the future holds great promise for aggregators of knowledge and for building bridges across knowledge domains, for example, to avoid reinventing someone else's wheel, or to combine resources in challenging economic times. As advocates for this new, fuzzy, "field of fields," SEAD will continue to support the needs and to celebrate the diversity of this burgeoning community.

NSEAD participants

\+ *Meeting 1, Center for Design Innovation, University of North Carolina*
September 20-October 1, 2011

* *Meeting 2, Maryland Institute College of Art, Baltimore*
November 14-15, 2011

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