

# Steve Harrison, AIA

*work at a distance*

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## PRECIS:

My research has been to use video to break time and distance. It is informed by studies I have carried out of creative people working together. My research focuses on the life outside the computer box as much as within it; getting an understanding of the settings of use shapes the design of a system. I've done field and laboratory studies of collaboration, looking at the communications between people. And I've brought innovative ideas from the lab out to real work situations for evaluation.

This unique approach produced the seminal computer supported cooperative work system known as the Media Space and contributed to the development of a number of shared drawing tools, culminating in the Drawstream Station, all of which employ video in novel ways. Being a student of design, as well as media, has led most recently in developing exhibits and the overall program for "XFR: experiments in the Future of Reading". These have been reported in numerous technical publications and conference proceedings, the popular press and cited with two prestigious design awards.

The studies of process and the technological interventions I've created have resulted in a number of novel insights; "Re-Place-Ing Space" (Harrison and Dourish, 1996) is an oft-cited paper on the behavioral framing of real and virtual space.

This interwoven design and research approach continues with a study of the practices of design review in many disciplines. The goal is to provide local tactics for design review practitioners and strategies for designing more effective design reviews.

## PROFESSIONAL EXPERIENCE:

### **Virginia Polytechnic Institute and State University, Blacksburg, VA**

*Computer Science Faculty*

*Fall 2003-present*

Conducting research on communicative surfaces and other HCI topics; developing program of design concerns to improve engineering teaching and research.

### **University of California, Berkeley, CA**

*Lecturer, CS 298-12, "Design Realization"*

*Fall 2002*

Teaching a graduate class in design of interactive devices. Takes students through -- and beyond -- HCI methods to understand design in larger context. Emphasizes teamwork, innovation, and iteration.

### **eXFR Partnership / theREDshift, Portola Valley, CA**

*Founder, Partner and Treasurer*

*2002-2003*

Founder of two start-ups to provide design-based research services to industrial and academic R&D.

## **Xerox Palo Alto Research Center, Palo Alto, CA**

*Member of the Research Staff II*

1985-2002

Studied the practice of design, built new experimental tools for distributed designers, and created new design-based research paradigms. This work has been carried out in various Laboratories at PARC:

- **Research in Exploratory Documents.** The overall project of RED was the creation of new genres arising from new media and new combinations of media. I carried this out in a number of projects: investigating the future of reading, creating exhibits and co-managing RED-wide project to build exhibits for Tech Museum of Innovation; created the DrawStream Station creating 2 new genres, AVC's and video cocktail napkins; carried out study of design pedagogy with School of Architecture and Planning at MIT; invented a "studio" model for research; managed the PARC Artist In Residence Program ("PAIR").
- **Information Sciences and Technology Laboratory.** Created collaborative tools to support meetings; studied and improved PARC's internal intellectual property processes; and conducted controlled experimental study of product designers' social and cognitive activities.
- **System Sciences Laboratory.** Created new collaborative shared drawing tools for designers; carried out ethnographically-informed studies of product designers using Media Space.
- **Systems Concepts Laboratory.** Invented, developed and used the audio/video/computing design environment (the "Media Space") to explore the effects of various media on the social process of design. This term is now industry-standard term generically applied to electronically extended physical spaces. Carried out case studies of industrial and architectural design.

## **Skidmore, Owings & Merrill, San Francisco**

*Information Systems Manager*

1974-1985

As manager, responsible for all CAD system and data processing operations, programming and analysis, hardware and software selection and maintenance, personnel, data communications, and budget control in a multi-site/multi-CPU environment. Operation provided service for all West Coast Offices (450 Employees) of international architectural firm. Includes largest CAD project undertaken by SOM (at that time). Built up department to 12 employees.

As system designer and developer, proposed CAD system migration strategy from time-sharing to networked workstation environment that was adopted by entire firm; designed and wrote data base systems for architectural design, land use planning, transportation and housing, inventory, and office management; wrote and implemented conversion to an on-line interactive accounting and job costing system from a batch-oriented one; and initiated integrated office automation system.

**TEACHING EXPERIENCE:**

- CS 6724 “Media Space Seminar” *Spring, 2008*  
Department of Computer Science, Virginia Tech
- CS 2984, “Media Computation” *Spring, 2008, ‘07*  
Department of Computer Science, Virginia Tech
- CS 4634, “Design of Information” *Fall, 2007, ‘06, ‘04*  
Department of Computer Science, Virginia Tech
- CS 59844, “Creative Realization of HCI devices” *Spring, 2007*  
Department of Computer Science, Virginia Tech
- CS/Art 4984, “CyberArt” *Fall, 2007, ‘06*  
Departments of Computer Science, Art, Music,  
and Communications Virginia Tech *F+Sp, 04-05, 05-06*
- CS/IDS 5984, IDS 4984 “Design Realization: Interactive Museum Exhibits” *Fall, 2005*  
Departments of Industrial Design and Computer Science, Virginia Tech
- CS 5984, “Design of Interactive Systems” *Spring, 2004*  
Department of Computer Science, Virginia Tech
- CS 3724, “Introduction to HCI” *Spring, 2004*  
Department of Computer Science, Virginia Tech
- CS 294-12, “Design Realization” *Fall, 2002*  
Department of Engineering and Computer Science, UC Berkeley
- Arch 139, "Computer Applications in Architecture" *Spring 1984*  
Department of Architecture, UC Berkeley

**EDUCATION:**

- Master of Architecture, University of California, Berkeley *1977-1978*
- B. A. University of California, Berkeley major: Architecture *1969-1973*

**PROFESSIONAL REGISTRATION:**

- Architect, California Registration (# C 30329)

**PUBLICATIONS:**

- Harrison, S.** Tatar, D. and Sengers, P. (under review) “The Three Paradigms of HCI”, *Journal of HCI*, Taylor and Francis.
- Otitoju, K., **Harrison, S.** (2008) “Interaction as Component of Meaning-Making” *Proceedings of DIS 2008*, Capetown, South Africa, March 2008.

- Harrison, S.** (2008) "Seeing the Hole in Space", *HCI Remixed*, Erickson, T. and MacDonald, D. eds. Cambridge, MIT Press, pp155-160.
- Kim, K., Tatar, D. and **Harrison, S.** (under review) "The effects of handheld network service "look" on the acquisition of common ground", *TOCHI* ACM Press.
- Harrison, S.** Tatar, D. and Sengers, P. (2007) "The Three Paradigms of HCI", *Proceedings of CHI 2007*, alt.chi, San Jose, CA, May 2007.
- Harrison, S.** and Tatar, D. (2007) "Places: People, Events, Loci. The relation of semantic frames in the construction of place" *Journal of Computer Supported Cooperative Work*, Springer, (Online First Oct 30, 2007: <http://www.springerlink.com/content/18521t857m672ugu/?p=55ed454c788547419e6b8a8c13bb5870&pi=0> bound publication awaiting completion of special issue)
- Kim, K., Tatar, D. and **Harrison, S.** (2008) Sharing Visual Context to Facilitate Late Overhearers' Understanding of the Handheld-Based Learning Activity, Conference on Computer-Supported Collaborative Learning
- Kim, K., Tatar, D. and **Harrison, S.** (November, 2006) Handheld-Mediated Communication to Support the Effective Sharing of Meaning in Joint Activity. *WMUTE 2006, The 4th IEEE International Conference on Advanced Learning Technologies*, November 17-18. Athens Greece.
- Lin, S., Tatar, D., **Harrison, S.**, Roschelle, J. & Patton, C. (2006) Learning When Less is More: "Bootstrapping" Undergraduate Programmers as Coordination Designers. *Participatory Design Conference*, Trento Italy, August 1-5, 2006.
- Harrison, S.** Back, M., Tatar, D. (2006) "'It's Just a Method': A Pedagogical Experiment In Interdisciplinary Design" *Proceedings of DIS 2006*, Penn State University, ACM Press, June 2006.
- Harrison, S.** and Tatar, D. (2006) "More Than a Method" *Proceedings of HICEd2006 -1 Inventivity: Teaching Theory, Design and Innovation in HCI 2006* Limerick, Ireland, March, 2006.
- Tungare, M., Pyla, P., Bafna, P., Glina, V., Zheng, W., Yu, X., Balli, U., **Harrison, S.** (2006) "Embodied Data Objects: Tangible Interfaces to Information Appliances" *Proceedings of 44<sup>th</sup> ACM Southeast Conference*, Melbourne, FL, March, 2006.
- Harrison, S.** and Tatar, D. (2005) "The Anywhere Museum: Genres of Teachable Moments" poster at *New Paradigms for Using Computers*, IBM Almaden Research Center, San Jose, CA, July, 2005.
- Harrison, S.** and Back, M. (2005) "'It's Just a Method': A Pedagogical Experiment In Interdisciplinary Design" *Proceedings of CHI 2005*, alt.chi, Portland, OR, April 2005.
- De Guzman, E, Back, M., **Harrison, S.**, Ho-Ching, W., Matthews, T., Rattenbury, T. (2003) "EEWWW! Tangible Interfaces for Navigating Inside the Human

Body." *Proceedings of CHI 2003, Short Papers*, Ft. Lauderdale, FL, ACM Press, April 2003.

McKelvin, M, Back, M, **Harrison, S.**, Nestande, R., Valdez, L., and Yee, K. (2003) "SeismoSpin: An Interactive Instrument for Seismic Data." *Proceedings of CHI 2003, Short Papers*, Ft. Lauderdale, FL, ACM Press, April 2003.

Back, M. and **Harrison, S.** (2003) "The Roads Not Taken: detours and dead ends on the design path of Speeder Reader." *Proceedings of DIS '02*, ACM Press, June 2002. London.

**Harrison, S.**, Minneman, S., Balsamo, A. (2001) "The How of XFR: eXperiments in the Future of Reading." *Interactions*. Vol 8, issue 3. New York: The Association for Computing Machinery. June 2001. pp 31-41.

**Harrison, S.**, Minneman, S., Back, M., Balsamo, A., Chow, M., Gold, R., Gorbet, M., MacDonald, D., (2001) "The What of XFR: eXperiments in the Future of Reading." *Interactions*. Vol 8, issue 3. New York: The Association for Computing Machinery. June 2001. pp 21-30.

Back, M., Cohen, J., Gold, R., Gorbet, M., **Harrison, S.**, Minneman, S. (2001) "Speeder Reader: An Experiment in the Future of Reading." *Proceedings of SIGGRAPH 2001*, ACM Press, August 2001.

Back, M., Cohen, J., Gold, R., **Harrison, S.**, Minneman, S. (2001) "Listen Reader: an electronically augmented paper-based book." *Proceedings of CHI 2001*, ACM Press, April 2001.

Back, M., Chow, M., Gold, R., Balsamo, A., Gorbet, M., **Harrison, S.**, MacDonald, D., and Minneman, S. (2001) "Designing Interactive Reading Experiences for a Museum Exhibition." *IEEE Computer Magazine*, Vol. 34, No. 1, January 2001, 1-8.

Back, M., Cohen, J., Gold, R., **Harrison, S.**, Minneman, S. (2000) "Page Detection Using Embedded Tags." *Proceedings of the ACM Symposium on User Interface Software and Technology, CHI Letters* Vol. 2, No. 2, ACM Press, November 2000, 159 - 160.

Balsamo, A., Gorbet, M., **Harrison, S.**, Minneman, S. (2000) "The Methods of Our Madness: Research on Experimental Documents." *Proceedings of ACM CHI 2000*. Reading, MA: Addison-Wesley.

**Harrison, S.** (2000) "The Place of the Artist. Art and Innovation." *The Xerox PARC Artist-in-Residence Program*. (Harris, C. ed.) 1999. Cambridge, MIT Press. Pp 36-45.

**Harrison, S.**, Minneman, S., Marinacci, J. (1999) "The DrawStream Station or the AVC's of Video Cocktail Napkins." *The Proceedings of the International Conference on Multimedia Systems '99*. June, 1999, Firenze, Italy, IEEE Press.

Minneman, S., and **Harrison, S.**, (1998) "Negotiating Right Along: An Extended Case Study of the Social Activity of Engineering Design" *The Design Productivity Debate*, (Duffy, A.H.B. ed.) 1998, London, UK Springer-Verlag Ltd. pp 32-50.

- Harrison, S.,** Bly, S., Anderson, S., Minneman, S., (1997) "The Media Space" *Video-Mediated Communication*, (Finn, K., Sellen, A., & Wilbur, S. eds.) 1997, Mahwah, NJ Lawrence Erlbaum Associates pp 273-300.
- Harrison, S.,** and Minneman, S. (1996) "Space, Timestreams, and Architecture. Design in the Age of Digital Video." *Proceedings of the Design Team of the Future Conference*, December 4, 1996. Cambridge, MA: MIT Series on Technology and the Corporation.
- Harrison, S.** and Dourish, P., (1996) "Re-Placing Space: The Roles of Place and Space in Collaborative Systems." *Proceedings of ACM CSCW 96*. November 18-21, 1996. Reading, MA: Addison-Wesley pp 67-76.
- Moran, T., Chiu, P., **Harrison, S.**, Kurtenbach, G., Minneman, S., and van Melle, W., (1996) "Evolutionary Engagement in an Ongoing Collaborative Work Process: A Case Study." *Proceedings of ACM CSCW 96*. November 17-20, 1996. Reading, MA: Addison-Wesley pp 150-159.
- Harrison, S.,** and Minneman, S. (1996) "A Bike In Hand" *Analysing Design Activity*, (Cross, N., Christians, H., & Dorst, K. eds.) 1996, Chichester, UK, John Wiley & Sons pp 417-436.
- Minneman, S., **Harrison, S.**, Janssen, W., Kurtenbach, G., Moran, T., and Smith, I. (1995) "A confederation of tools for capturing and accessing collaborative activity." *Proceedings of ACM Multimedia 95*, November 5-9, 1995. Reading, MA: Addison-Wesley, pp 523-534. [Selected as Best Paper at Conference]
- Harrison, S.,** and Minneman, S. (1995) "Studying Collaborative Design to Build Design Tools." *The Global Design Studio. Proceedings of the Sixth International Conference on Computer-Aided Architectural Design*, September 24-26, 1995. Center for Advanced Studies in Architecture, National University of Singapore. pp 687-698.
- Minneman, S. and **Harrison, S.** (1993) "Where Were We: making and using near-synchronous, pre-narrative video." *Proceedings of ACM Multimedia 93*, August 1-6, 1993. c/o ACM, NY. pp 207-214.
- Harrison, S.** (1993) "Design Tools for the Communications Decade." *Proceedings of Architecture & Creativity: the Impact of New Design Tools*. American Institute of Architects, Washington, DC, June, 1993.
- Harrison, S.** (1993) "Computing and The Social Nature of Design." *ACADIA Quarterly*. University of Southern California, Los Angeles; vol 12, number 1, Winter 1993, pp10-18.
- Bly, S., **Harrison, S.**, and Irwin, S. (1992) "Media Spaces: Bringing people together in a video, audio, and computing environment." *Communications of the Association of Computing Machinery*, NY; vol. 36, no. 1, January 1993. pp 28-45.
- Harrison, S.,** and Minneman, S. (1992) "Tools, Communication, and the Nature of Design." Xerox Corporation, Palo Alto. January 1992.

- Harrison, S.**, Minneman, S. , and Irwin, S. (1992) “Graspable Implications: a study of 3-D objects in remote collaboration.” Xerox Corporation, Palo Alto. January 1992.
- Harrison, S.** The (1991) “View from the Media Space: People, Events, Places.” Xerox Corporation, Palo Alto. October 1991.
- Stults, R., **Harrison, S.**, and Minneman, S., (1989) “The Media Space — experience with video support of design activity.” In: *Engineering Design and Manufacturing Management*, A.E. Samuel (Ed), Elsevier, Amsterdam; 1989. pp 164-176.
- Harrison, S.**, Minneman, S., and Stults, S., (1989) “Design Communications Workshops.” In: *Engineering Design and Manufacturing Management*, (Samuel, A. ed.), Elsevier, Amsterdam. 1989. pp 175-195.
- Harrison, S.**, Minneman, S., Stults, R., and Weber, K. (1989) “VIDEO: a design medium.” *SigCHI Bulletin*. Association for Computing Machinery/CHI, New York; October 1989.
- Harrison, S.**, and Minneman, S., (1989) “The Media Space: an Electronic Setting for Design.” Xerox Corporation, Palo Alto. October 1989.
- Weber, K., **Harrison, S.**, Minneman, S., and Stults, R. (1989) “Office Design Project.” In: *SigCHI Video Review*. Association for Computing Machinery/CHI, New York, vol. 21, number 2, May 1989.
- Harrison, S.** (1987) “Shoptalk 3: Design and Media Spaces.” (videotape) Xerox Corporation, Palo Alto. 1987.
- Harrison, S.**, and Stults, S. (1986) “Shoptalk 2: Two Views of a Conversation.” (videotape) Xerox Corporation, Palo Alto. 1986.
- Harrison, S.** (1983) “Coordinating A/E/C CAD, Skidmore, Owings & Merrill's Approach.” *Computer Graphics World*. vol. 6, San Francisco, no. 11, November 1983.

## REPORTS BY OTHERS OF MY WORK:

- Gaver, W. Closing Keynote *Designing Interactive Systems Conference* February, 2008. Cape Town, South Africa. (Featured “The Third Paradigm”.)
- <http://bayosphere.com/node/763> (Report on “Anywhere Museum presentation at IBM Almaden NPUC conference, July 2005.)
- Hales, K. *Writing Machines*. MIT Press, Cambridge, 2002. pg 23.
- “21 Designs for 2021” *Metropolis Magazine* Volume 20, Number 7 March, 2001. On line at [http://www.metropolismag.com/html/designis/designis\\_71-75.html](http://www.metropolismag.com/html/designis/designis_71-75.html)
- Scanlon, J. “Watch Dog” *Wired* April, 2000. p 60

- Nicholson, L. "How many ways can one red? California museum dares to ask" *The Philadelphia Enquirer*. May 11, 2000 pp F1-F6
- Helfand, D. "Boldly Going Beyond the Printed Page." *Los Angeles Times*. July 2, 2000. p B2
- Thym, J. "An open book." *The Fremont Argus*, 2000. pp Cue 1-Cue-4
- Weise, E. "Reading, fundamentally rethought." *USA Today* Feb 38, 2000. p 3D
- Taylor, C. "Inventions 2000: Team Xerox." *Time Magazine* Dec 4, 2000
- Gold, R. "Xerox PARC at 30. Inside a Research Lab" *Dr. Dobb's Journal*. Dec, 2000. pp 42-46.
- Farmanfarmaian, R. "Beyond E-Books. Glimpses of the Future." *Publiushers Weekly*. Jan 1, 2001. pp 56-57.
- "Big Red Room Divider" *Sunset Magazine* (for feature on remodeling of my house in Portola Valley ) April, 1996.
- "Western Home Awards for 1995: Carport" *Sunset Magazine* (for feature on remodeling of my house in Portola Valley ) October 1995.
- Netropolitan. *New Scientist*. Mar 4, 1995
- Novitski, B. J. "Designing by Long Distance". *Architecture* American Institute of Architects. c/o BPI Communications, NY; vol. 83, no. 2; February 1994. pp 117-119.
- Olson, M., and Bly, S. The Portland Experience: a report on a distributed research group. *International Journal of Man-Machine Studies*. S. Greenberg (Ed) Academic Press, Harcourt Brace Jovanovich, London, vol. 34 no. 2; February 1991.
- Lo Spazio Virtuale. *Technologia*. Xerox Corporation, Milan, no. 3, March 1990.
- Stults, R. Experimental Uses of Video to Support Design. Xerox Corporation, Palo Alto. #SSL-89-19. 1989.
- Weber, K., and Minneman, S. Office Design Project. (videotape) Xerox Corporation, Palo Alto. 1987.
- On-Line to the Future. *USA Today*. June 8, 1987.
- "Media Spaces at Xerox PARC". *Wall Street Journal Television*. Broadcast March 22, 1987.
- Ferrell, J. They're Talking Face-to-face via Computers. In *Leading Edge*, *San Francisco Examiner*. November 20, 1986.
- Stults, R. *Media Space*. Xerox Corporation, Palo Alto. 1986.

**OTHER PROFESSIONAL EXPERIENCE:**

Reviewer, National Science Foundation	2008
Panel organizer, "Media Space 20 Years On" CHI 08	April, 2008
SIG co-organizer, "Beyond Usability" CHI 07	April, 2007
Workshop organizer, "Media Space-Reflecting on 20 Years" CSCW 06	Nov, 2006
Session chair, DIS 2006	June, 2006
Papers reviewer, DIS 2006	Feb, 2006
Workshops co-Chair CHI 2006	2005-2006
Papers, Late-Breaking Results, and Design Expo reviewer, CHI 2005	Oct, 2004
Advisory Board: LIFE Consortium, Stanford University	May, 2005
External PhD. dissertation reviewer, University of Queensland Australia	Apr, 2004
Papers and Tech Notes reviewer, UIST 2004	Apr, 2004
Papers and Notes reviewer, CSCW 2004	Apr, 2004
Papers, Cases and Posters reviewer, DIS 2004	Feb, 2004
Coach, Product Design Team Stanford University	Spring 2003
Papers and Late-Breaking News reviewer, CHI 2004	Oct, 2003
Tutorial instructor, "Visual Support for Conversation" CSCW 2002, New Orleans, LA	Nov, 2002
Paper reviewer, CHI 2003	Oct, 2002
Coach, Product Design Teams University of California (various classes, Mechanical Engineering and Hass School of Business) Berkeley, CA	2002-2003
Coach, Destination Imagination Design Team Corte Madera School, Portola Valley, CA	2002-2003
Treasurer, BayCHI	2002
Board Member, Berkeley Institute of Design Advisory Panel University of California, Berkeley	2002-present
Cub Scout Den Leader	2001-2003

Commissioner, Architectural Site Control Commission (design review) Town of Portola Valley, CA	1996-2003
Paper reviewer, CHI '98	Oct, 1998
Director, PARC Artist in Residence Program ("P.A.I.R.")	1998-2001
Guest Critic: Graduate Architectural Studio: "Daedalus" Massachusetts Institute of Technology, Cambridge, MA	Fall 1997
Moderator / organizer: "The Participatory Design of Work Space" Participatory Design Conference '96, Cambridge MA	Nov. 1996
Video Reviewer, CSCW	June 1996
Moderator: "Architected Sound, Urbanity, and Paranoid Space" SoundCulture, San Francisco, CA	April 1996
Committee member, General Plan Review Committee Town of Portola Valley, CA	1994-1996
Invited speaker: "Whatever Became of the Paperless Office" AIA / Minnesota 1994 Convention	Nov. 1994
Invited speaker / workshop organizer "Design Tools for the Communications Decade" Stanford Design EXPERience, Stanford	March 1994
Invited speaker: "Architecture & Creativity: Design Tools for the Communications Decade" A/E/C Systems '93 (AIA Symposium), Anaheim	June 1993
Invited speaker: "Design Tools for the Communications Decade" Design Education & Technology, Harvard/GSD	May 1993
Speaker: "Computing and the Social Nature of Design" AAAI Spring Symposium, Stanford University	March 1993
Speaker: "Media Space: the use of video as a design medium" National Symposium on Concurrent Engineering, Washington DC	June 1992
Invited speaker: "If Multimedia has arrived, where do we go from here?" Comdex Spring '92, Chicago, IL	May 1992
Invited speaker: "Design Communications" School of Engineering, UC Berkeley	July 1991
Invited speaker: "Talking about Talking: Design at a Distance" Pan Pacific Working Meeting, Illinois Institute of Technology, Chicago	July 1990
Founding chair, Design Activities Study Group Xerox PARC	1989-1996

- Workshop organizer: "Design Communications Workshop"  
Participatory Design Conference '90, Seattle *April 1990*
- Invited speaker: "Communications in Design"  
Department of Architecture, UC Berkeley *Nov. 1989*
- Speaker: "Video: a Design Medium"  
SigCHI Workshop: Video as a Research and Design Tool, MIT *March 1989*
- Workshop organizer: "The Media Space for Design"  
International Workshop on Engineering Design and Manufacturing Management, University of Melbourne, Melbourne, Australia *Nov. 1988*
- Workshop organizer: "Design Communications Workshop"  
Design Division, Stanford University *Oct. 1988*
- Keynote speaker, ITS Conference on CAD in US, Tokyo Japan *June 1984*
- Lecturer: Arch 139, "Computer Applications in Architecture"  
Department of Architecture, UCB *Spring 1984*
- Program guest: "Architectural Modeling"  
Computer Chronicles, Produced for PBS by KCSM, San Mateo. *June 1983*
- Lecturer / course organizer:  
"Computers in Architecture: Technology of SOM"  
UC Extension, San Francisco, CA *March 1979*

**AWARDS AND GRANTS:**

- NSF CCF-0442469 (\$40,001) "CPATH CB: Connecting Computing Educators within and outside the traditional boundaries" *Sep., 2007*  
Pathways to Integrated Undergraduate Computing Education grant for the workshops to bring together computing educators who use innovative and engaging methods and topics. (co-PI)
- Best Engineering Project, Virginia Tech Campus Research Symposium, "Embodied Data Objects: Tangible Interfaces to Information Appliances" *March, 2006.*
- NSF ESI-0442469 (\$75,000) "Planning "Inside Phoebe's Field"" *Jan, 2005*  
Informal Science Education grant for the development and design of prototype traveling museum exhibition. (co-PI)
- NSF CNS-0423611(\$242,067) "Towards Unbounded Display" *Aug, 2004*  
CNS-CISE Research Resource grant for large displays for comparative HCI studies. (co-PI)
- Gold Medal, I.D. magazine Interactive Design Review *June, 2001*  
for the design of the ReadingWall in the "XFR: experiments in the Future of Reading" exhibition.
- Xerox Corporation, Internal Funding (\$800,000) *June, 1999*

Design and development “XFR: experiments in the Future of Reading” exhibition to demonstrate new technologies and new genres of reading.

Silver Medal, I.D. magazine Interactive Design Review *June, 2001*  
for the design of the ListenReader in the “XFR: experiments in the Future of Reading” exhibition.

Western Home Award *October 1995*  
Sunset Magazine / American Institute of Architects,  
for carport addition to my house in Portola Valley. With James Goring (Goring & Straja, Architects)

**PATENTS:**

U.S. Patent: 6,515,690. *Feb. 4, 2003*  
“Systems And Methods Providing An Interface For Navigating Dynamic Text”

U.S. Patent: 6,262,662. *Jul 17, 2001*  
“Systems and Methods that Detect Proximity Information Using Electric Field Sensing Devices and a Page Identification using Embedded Identification Tags”

U.S. Patent: 6,239,801. *May 29, 2001*  
“Method and System for Indexing and Controlling the Playback of Multimedia Documents”

U.S. Patent: 5,986,655. *Nov 16, 1999*  
“Method and System for Indexing and Controlling the Playback of Multimedia Documents”

U.S. Patent: 5,717,879. *Feb 10, 1998*  
“System for the Capture and Replay of Temporal Data Representing Collaborative Activities.”

US Patent: 5,692,213 *Nov 25, 1997*  
"Method for Controlling Real-Time Presentation of Audio/Visual Data on Computer System"

US Patent: 5,239,373 *Aug 24, 1993*  
"Video Computational Shared Drawing Space"

US Patent: 4,987,492 *Jan 22, 1991*  
"User interface control for communications system"

**MUSEUM SHOWS:**

“XFR: Experiments in the Future of Reading” *June-Nov, 2002*  
Traveling exhibition at Liberty Science Center, Jersey City, NJ  
<http://www.astc.org/exhibitions/xfr/dxfr.htm>

“XFR: Experiments in the Future of Reading” *June-Oct, 2001*  
Traveling exhibition at Arizona Science Center, Phoenix, AZ  
<http://www.astc.org/exhibitions/xfr/dxfr.htm>

“XFR: Experiments in the Future of Reading” *Mar-Sep, 2000*  
Inaugural run at Tech Museum of Innovation, San Jose, CA  
<http://www2.parc.com/red/projects/xfr/>

“Space Between” *Fall 1997*  
Interactive piece in conjunction with artist Will Tait. San Francisco Museum of  
Modern Art Rental Gallery, Ft. Mason, San Francisco, CA

## PROJECTS:

**Designing Interaction Journal.** I am currently leading an effort to launch *Designing Interaction Journal* that will provide a scholarly venue for in-depth articles on the subject of design of interactive devices and systems. Design of interactive systems has gained legitimacy across the HCI community in recent years, but there is no journal devoted to it. We propose a scholarly journal dedicated to design of innovative interactive devices and systems, investigations of design process, and design as a means of investigation into interaction. The editorial board of MIT Press has approved the project and we are in negotiations with regard to scope and support. We hope to formally announce. At the DIS 2008 conference in Capetown, South Africa.

**Critical Analysis. Collective Reflection in Design Review.** I am researching a book on design review. Design review is ubiquitous: it goes on in design school (in fact, it may be the only common thread across the pedagogy of different design disciplines), industry, and government. Being a foundation of architecture, planning, product design, theater, industrial research, mechanical engineering, film production, software engineering, and even governmental review, does not mean it is without problems or even that it is well understood. The book asks, “What makes a good review?” Why is this process and this structure so common, yet sometimes problematic? Are the things that constitute good review the same for design education and design practice? The same for large and small practices? The same for film and product design? The same for internal reviews and ones with clients? Where would one turn to prepare to present at a review? Where would one turn to design a review process?. The goal of this research is to give everyone who does design review tactical moves that will improve the design reviews as we now practice them as well as for creating new design review processes. The central idea is that of collective reflection. Following from Don Schon’s ideas about reflective design practice, this idea suggests valuing all roles in reviews as a learning process – one in which “success” is measured by the collective learning. The audience for this book is design practitioners, project managers, design educators, and design researchers.

**Space Between.** The Space Between project explored the nature of idle exploration and collaborative discovery. Using shared drawing technology (see PARC projects, below), SF MoMA rental gallery visitors would dig through beach sand to encounter the image of the hands and beach toys of other visitors. With artist Will Tait.

**I-5.** Beginning in 1988 and continuing to this day, the I-5 Project is a long-term record of an experience common to most Californians – the drive along Interstate 5 between Los Angeles and the San Francisco Bay Area. Visually documenting every trip taken along this highway (averaging about 4 per year), the project uses various media and structured recording methodologies.

Virginia Tech:

**CyberArts.** As we learned in the PARC Artist-in-Residence Program (“PAIR”), collaboration between the arts and technology can be an exciting driver of innovation. At Virginia Tech, the CyberArts “Collaborative” brings together art, music, communications, computer science, and other disciplines. I have worked with faculty and administrators:

- defining programmatic options such a collaboration might pursue;

- describing immediate and future studios and other facilities;
- developing grant opportunities;
- teaching the pilot class.
- Chairing faculty search committee (CS/Animation and Graphics)

**Anywhere Museum: the Place of Engineering.** A project of the College of Engineering to connect communities within and outside of the College by making the public spaces “tell the story of engineering”. Therefore, the spaces of the College should:

- present the story of the College as the evolving, vibrant, and innovative programs and departments that constitute it;
- support formal pedagogy by creating ‘teachable moments’;
- highlight points of connection across engineering disciplines;
- make engineering visible to students as they move between classes and labs;
- involve students in active participation in the creation of engineering culture.

The project has deep budget constraints and so requires leveraging opportunities as they arise. One project in development will annotate the outside of the very large campus wind tunnel with a laser projector illustrating air flow, outline models under test, formulas and calculations. Project Director.

**Communicative Surfaces** We are approaching the point when most any surface in the built environment or object in the environment can be a transformable display. At the same time MEMS, technology is making ubiquitous interaction possible. This work examines that situation from a number of approaches: how will the meaning of space and place change? what new genres may arise? what should the system architecture be? what abstractions and ontologies make sense? One current activity is the development of a proposal for a gigapixel display consisting of an array of physically and logically reconfigurable high resolution LCD panels with the Virginia Tech Center for Human Computer Interaction.

Xerox PARC:

**XFR: eXperiments in the Future of Reading -- an Exhibition at the Tech Museum of Innovation and a research project.** Seen and used by 300,00 visitors, XFR is an interactive, entertaining and educational exhibition that explores the history of reading, the technologies of today's reading and a few experimental forays into the future of reading. It is intended to make the visitor aware of reading in its many forms, its expanding technologies, its methods and genres, and its promise. It dispels the concept that the digital age will make reading obsolete; it shows how new media creates new genres. The exhibition is composed of multiple independent exhibits, each exploring a different aspect of the message. I developed the overall appearance and layout as well as exhibits showing the history of reading and scanning technology. The visitor “reads” their way in and out without being conscious of it – the same way that we cannot help but read once we have learned how. <http://www.parc.xerox.com/xfr>

**REDAEDALUS: The PARC/MIT Virtual Design Studio.** During the Fall of 1998, I was one of the instructors in a graduate design studio in the School of Architecture and Planning at MIT. To assess the DrawStream Station, we (Scott Minneman and I) carried out "desk crits" from our lab and offices at PARC. A desk crit is the central pedagogical activity of architectural design education. Just as in a commercial practice, project heads and other experts review drawings, models, and computer renderings. This is more than a thumbs up/thumbs down kind of review; usually the criticism takes the form of design with the student. We uncovered two genres: asynchronous video conversations (self-contextualizing threaded multimedia conversations) and video cocktail

napkins (recorded video fragments that are used as conversational props). Project leader.

**PAIR: the PARC Artist in Residence Program.** PAIR brought artists into PARC in order to spark intellectual inquiry and broaden the forms of legitimate industrial research. Begun by Rich Gold, I followed as the program's second director. Artists familiar with technology were paired with researchers with an interest in the arts; appropriate joint projects were developed. The goal was to create better artists and better researchers rather than art with more sophisticated technology or "prettier" new technology.

**Design in the Age of Digital Video.** In this project, digital video allowed people to simultaneously watch video recordings and make (or link in) new ones composed of their commentary and viewing reactions, creating threaded video conversations. It uses the TimeStream architecture (a.k.a. "Coral") to play recordings, make new recordings while watching others, and correlate the two. This was combined with the VideoDraw system to create a "DrawStream" station that permits users to make reference to objects and drawings on a shared work surface and to record, index and retrieve these discussions.

**The Social Construction of Intellectual Property.** This is study of the complex relationship of ideas to innovation. Like my studies of design, it is predicated on the idea that innovation is a social process. So, improving PARC's intellectual property position, means improving its communication practices. This project explores technologies to support the capture and development of intellectual property and the development of "communities of invention". Project leader.

**Where Were We.** An innovative system of digitally recorded audio and video that permits designers to include snippets of recently recorded material in everyday activity, such as brainstorming meetings.

**Design Place 90.** Created a shared work environment for industrial designers from David Kelley Designs (now IDEO). Observed them working at distance using CAD, e-mail, phone, conference phone, CADD, and Media Space. Observations used to guide development of next design of technology to support distributed work with and about real objects and spaces. Project leader.

**Shared Drawing.** Using video and computing technology, explored the ways drawing, sketching, and gesturing can be done at a distance.

**Design Communications Workshops.** Groups play roles of different interest groups in design to explore inter- and intra-group communications in design.

**Electronic Notebook of Engineering Process.** A record able video disc and hypercard were combined to form a prototype open-ended project notebook. Assisted R. Stults and K. Weber.

**Mechanical Design Project.** The design of a fix to a forthcoming product was studied. Video was used by members of the design team to record their activities; the recordings were used by them as a medium of design communications and a shared project journal. With R. Stults, S. Minneman, and K. Weber.

**Century Cable Harness Action Team.** The use of video to communicate between various groups involved in the transit from design to manufacturing was prototyped and studied.

**"The Portland Experiment".** Compressed video, open audio, shared computer file systems, and regular group meetings were used to support a research laboratory split between Palo Alto and Portland. Was an on-going collaborator, contributor, regular lab staff, and part-time visionary, along with every other lab member.

**Media Space Link from 16 to 26.** Public spaces on different floors of PARC were linked using open audio and video. Explored the limitations of the technology to bridge cultural gap within organizations.

**Object Service / Terrain of Associations.** A representation of the associations individuals have that give design inspiration and shape design direction. The project explored various ways of maintaining a shared database so that a group could keep current with the design direction of its membership.

**Office Design Project.** 3 architects worked together using real-time and recorded video in a simulated physically-distributed design studio. Co-produced with Bob Stults.

**Media Space.** An audio/video/computing environment for temporally and physically disjoint designers. System is backbone of PARC multi-media research and the technological expression of ideas to support the social basis of design. A series of implementations were developed and used in regular work by PARC researchers and designers engaged in real design projects. Co-developer of system and project co-leader with Bob Stults.

**ShopTalk.** Produced a series of polemical and illustrative videos. Videos lay out need to look at design as social process and the ability of video (coupled with computing) to better support this social process.

**House Addition.** The process of designing and building of an addition to a house was videotaped and put on video discs. This was a demonstration of a prototype design journal.

Projects at UC Berkeley:

**Numerically Valued Overlay** Thesis project for Master of Architecture degree. Site planning computer system combining parcel-attribute model with linkages model .

Projects at Skidmore, Owings, & Merrill:

**Pacific Bell San Ramon Valley Operating Center.** Managed the largest CAD project SOM had undertaken at that time. Computer supported full-service project; responsible for service delivery, organization and training of staff, and new system development.

**San Francisco Database.** Organized systematic digitization of San Francisco CBD, waterfront, Civic Center, and other urban features. Provided first comprehensive computerized database of volumetric information.

**Financial Management System** Designed and implemented conversion to an on-line interactive accounting and job-costing system from a batch-oriented one. Enabled accounting staff to support a company that tripled in size. Initiated integrated office automation system.

**Manpower Management System** Designed and implemented integrated project costing and planning system.

**Pacific Gas and Electric Site Selection System** Designed and wrote housing and transportation model to assess possible suburban sites for large office facility. System simulated impact on existing employees of relocation to possible suburban sites.

**Davies Symphony Hall.** Rapid structural engineering turn-around.

**Bandhar Shahpur New Town Planning System** Designed and wrote database system for land use planning. Allowed town planners to model economic and demographic impact of alternative layouts of town.

**Bank of America Data Centers' EIR** Developed 3-d CAD drawings for Environmental Impact Reports.