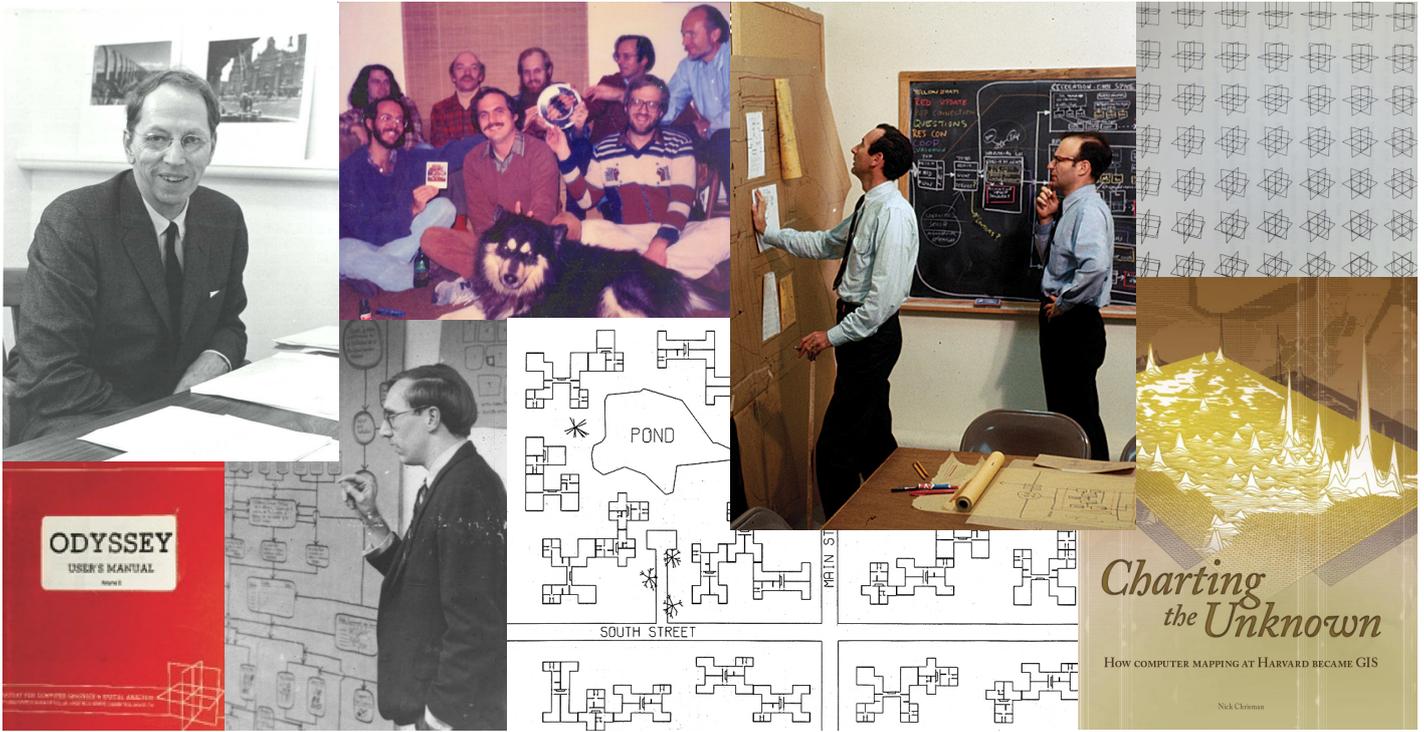


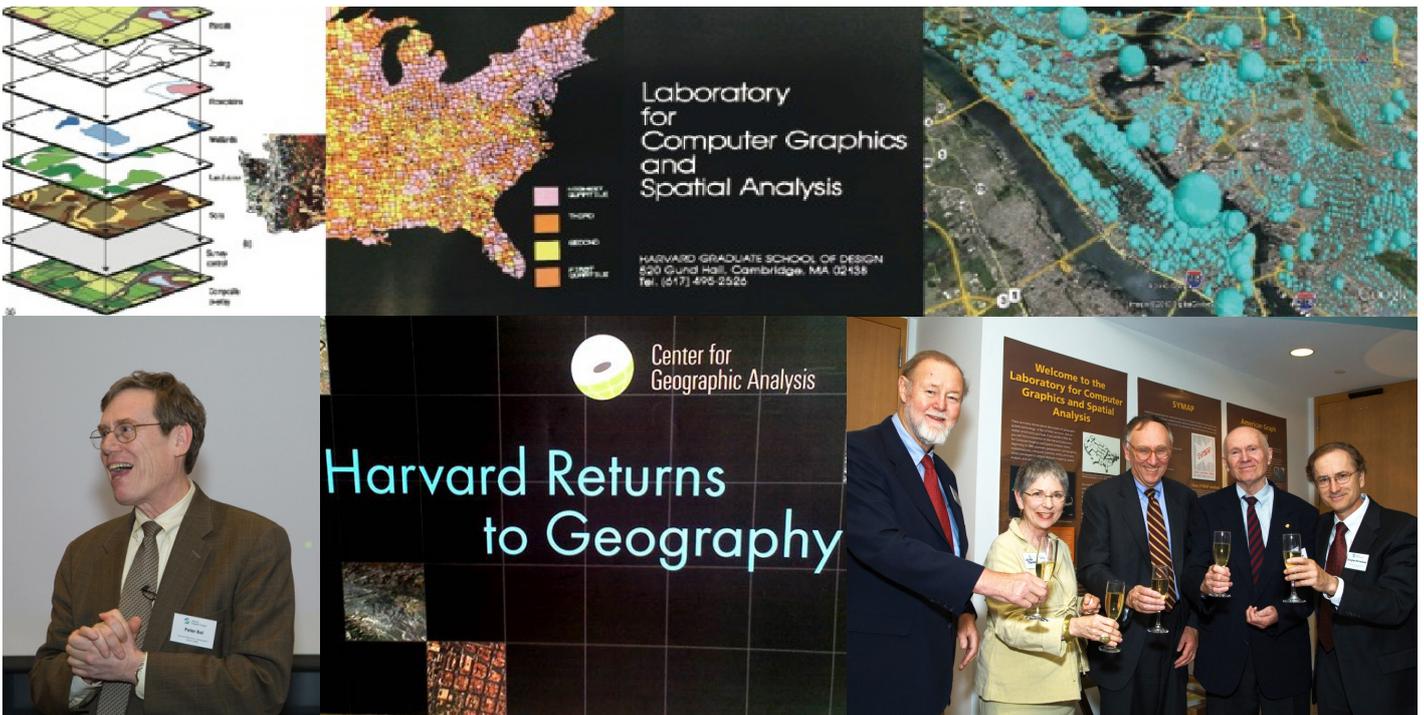
CGA Conference 2015



The Lab for Computer Graphics and Spatial Analysis (1965 - 1991) and Its Legacy

April 30th - May 1st, 2015

1730 Cambridge St., Cambridge, MA 02138



Sponsors: Esri & UCGIS

Co-hosts:

Center for Geographic Analysis

Harvard Graduate School of Design



1965 was a seminal year in the history of GIS, as the Harvard Laboratory for Computer Graphics (subsequently Computer Graphics and Spatial Analysis, LCG-SA) embarked on a 20+ year journey of research and development in theoretical geography, computer cartography, spatial analysis, and environmental design, which gave us many of today's essential ideas and early versions of tools now embedded in GIS, remote sensing, geospatial science, geodesign, and online culture.

Celebrate this 50th anniversary -- along with the 10th birthday of the CGA itself! -- with special presentations from original participants from those heady days, from the Graduate School of Design and other parts of Harvard, as well as GIS scholars and researchers from around the world, looking back to those early days of "the Lab", and tracing its legacy of seminal developments into the present and on into the future.

1:00 PM *Registration*

1:30 PM
Welcome & Introduction
Mohsen Mostafavi

RECOLLECTIONS

1:45 PM
Legacy of Howard Fisher
Jack Dangermond

2:15 PM
The Lab & the GSD
Carl Steinitz

2:45 PM
From Software to Data
Allan H. Schmidt

3:15 PM *Coffee Break*

3:30 PM
Opening Discussion on The Lab
Nicholas Chrisman, Geoff Dutton, Lawrie Jordan, Scott Morehouse, Donald Shepard, Eric Teicholz, Michael Woldenberg
Moderator: Matthew W. Wilson

5:00 PM *Reception & Exhibitions Opening - Frances Loeb Library*

8:30 AM *Registration and Breakfast*

REFLECTIONS

9:00 AM

Welcome

Alan M. Garber

9:15 AM

AAG Recognition

Doug Richardson

9:30 AM

Panel I: Histories

Nicholas Chrisman, Jeremy W. Crampton, John W. Hessler, Patrick McHaffie, Matthew W. Wilson
Moderator: Peter Bol

11:00 AM

Coffee Break

PROJECTIONS

11:15 AM

The Lab & Geography

Trevor Barnes

12:00 PM

Lunch & Poster Session - CGIS South Concourse

1:15 PM

Panel II: Legacies

Sara Irina Fabrikant, Michael F. Goodchild, Don Janelle, David M. Mark, David Tulloch, Charles Waldheim

Moderator: Matthew W. Wilson

2:45 PM

Coffee Break

TRANSFORMATIONS

3:00 PM

Panel III: Future Present

Hugh Keegan, Ben Lewis, Robert Gerard Pietrusko, Dana Tomlin, Sarah Williams

Moderator: Stephen Ervin

4:15 PM

Fisher and Davis Center Prize Presentations

Jack Dangermond, Alexandra Vacroux

4:30 PM

Closing Remarks

Jason Ur

5:00 PM

Reception - CGIS South Concourse

Welcome & Introduction

Mohsen Mostafavi

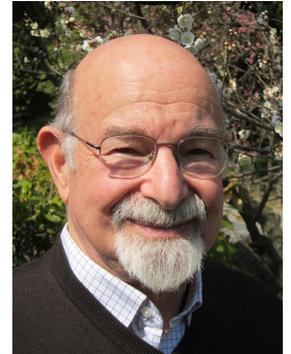
Mohsen Mostafavi, architect and educator, is the Dean of the Harvard Graduate School of Design and the Alexander and Victoria Wiley Professor of Design. His work focuses on modes and processes of urbanization and on the interface between technology and aesthetics. Mostafavi sits on the board of the Van Alen Institute, serves on the steering committee of the Aga Khan Award for Architecture, and is a member of the Urban Council Board of The Skolkovo Foundation. At Harvard, he co-chairs the Harvard University Committee for the Arts and co-chaired the Common Spaces Committee, and continues to serve on the Advisory Committee for Common Spaces Projects, the Smith Campus Center Executive Committee, the Harvard Library Board, and the Harvard Allston Steering Committee. He is a member of the Executive Committees of the Mahindra Humanities Center, the Harvard Innovation Lab, the Laboratory at Harvard, and the Standing Committee on Middle Eastern Studies.

**The Lab & the GSD**

Carl Steinitz

The Harvard Laboratory for Computer Graphics and the Graduate School of Design: work from 1963 to 1970 and some assessments

Carl Steinitz is the Alexander and Victoria Wiley Professor of Landscape Architecture and Planning Emeritus at Harvard Graduate School of Design, and Honorary Professor at the Centre for Advanced Spatial Analysis, University College London. Professor Steinitz has devoted much of his academic and professional career to improving methods for designing conservation and development in highly valued landscapes that are undergoing substantial pressures for change. He began his affiliation with the Harvard Laboratory for Computer Graphics and Spatial Analysis in 1965. In 1984, the Council of Educators in Landscape Architecture (CELA) presented Professor Steinitz with the Outstanding Educator Award for his “extraordinary contribution to environmental design education” and for his “pioneering exploration in the use of computer technology in landscape planning, especially in the areas of resource management and visual impact assessment.” Professor Steinitz is principal author of “Alternative Futures for Changing Landscapes”, Island Press, 2003, and author of “A Framework for Geodesign”, Esri Press, 2012.

**RECOLLECTIONS****Legacy of Howard Fisher**

Jack Dangermond

Jack Dangermond founded Esri in 1969 with a vision that a mapping and analysis framework could provide a deeper understanding of our world and help us design a better future. As founder and president of Esri, Dangermond’s leadership and vision stimulate the ongoing innovation of GIS technologies that enable people to make insightful decisions and improve the quality of life everywhere.

**From Software to Data**

Allan H. Schmidt

Harvard Laboratory for Computer Graphics and Spatial Analysis, From Software to Data as Recalled

Abstract: (1) Pioneering development of computer mapping packages (SYMAP, SYMVU, CALFORM, ASPEX, and ODYSSEY); (2) Creating innovative theories of geographic surfaces; (3) Development and demonstration of the theory of topological cartographic data structures and related software that provided basic building blocks for modern geographic information

systems (GIS), including polygon overlay; (4) Graphic techniques for displaying spatial-temporal data using time-lapse movies and holograms; (5) Conferences for practicing professionals and case study descriptions of applications of automated cartography; (6) Public promotion of automated cartography through example maps in national publications; and (7) Demonstration projects using the Laboratory's cartographic software to serve clients within the university as well as external public and private organizations.

Allan H. Schmidt formerly was Executive Director of the Harvard Laboratory for Computer Graphics and a specialist in research, development and application of computer technology as it relates to geographic information systems. Currently retired, he recently explored the origin and application of such technology in the life and times of Henry Thoreau. Results of his work have been reported as a series of presentations to the annual Gathering of the Thoreau Society. Recent reports may be found at <http://allanschmidt2.wordpress.com/> and <http://allanschmidt.wordpress.com>. He also serves as Chair of The Mill Brook Task Force, a subcommittee of Concord's Natural Resources Commission. http://www.concordma.gov/pages/ConcordMA_NaturalResources/subcomm/mbtf



Opening Discussion on The Lab

Nicholas Chrisman, Geoff Dutton, Lawrie Jordan, Scott Morehouse, Donald Shepard, Eric Teicholz, Michael Woldenberg
Moderator: Matthew W. Wilson

Nicholas Chrisman is currently Editor of the journal *Cartography and Geographic Information Science*, based in Bellingham, Washington. Until 2015, he was Professor of Geospatial Science and Discipline Head at RMIT University in Melbourne, Australia. From 2005-2012, he was Professor of



Geomatics Sciences at the Université Laval, Canada with his principal assignment as Scientific Director of the GEOIDE Network. From 1987-2004, he was Professor of Geography at University of Washington. From 1982-87, he was Assistant Professor in the Department of Landscape Architecture at the University of Wisconsin-Madison. From 1972-82 he was a programmer at the Laboratory for Computer Graphics and Spatial Analysis, Harvard GSD. His PhD is from the University of Bristol (UK) for research on error and statistics applied to categorical maps. For many decades, his writing has tried to connect the technical details of GIS to larger issues of philosophy, history and culture.

Geoffrey Dutton has designed, developed, used, and documented many software applications in academia and industry. He was a researcher in Harvard's Lab for Computer Graphics and Spatial Analysis from 1969 through 1984. He is best known as the editor of *Harvard Papers in Geographic Information Systems* and for his cartographic visualizations, most notably a four-dimensional holographic map animating 180 years of US population growth that has been exhibited at conferences, in museums, on public television, and is now in museum collections at MIT and Harvard. Subsequently, Geoff designed computer graphics exhibitions, created flight simulation software, designed geospatial databases, and conducted GIS application projects in transportation, water resources, and utility mapping for government clients. He presently works as a technical communicator and has created online user documentation for visualizing data, building analytic applications, and creating user interfaces for technical computing. He also reported on IT trends in his popular weekly newsletter on IT technology trends, *IDC's IT Forecaster*, followed by 100,000 subscribers. Geoff has degrees from Columbia, Harvard and the University of Zürich.



Lawrie Jordan is Director of Imagery at Esri, as well as special assistant to Esri founder, Jack Dangermond. Lawrie attended the GSD from

1973-1975, where he received his Masters in Landscape Architecture as a student of Carl Steinitz. From 1975-1978 Jordan worked with fellow GSD grads Bruce Rado and Doug Allen of the Georgia DNR along with Georgia Tech professor Nick Faust to create the first state-wide Landsat land cover map in the United States. This project proved to be instrumental in getting legislation passed to preserve and permanently protect Georgia's beautiful coastal Barrier Islands against imminent development threats. In 1978, Lawrie, Bruce, and Nick founded ERDAS, Inc., a pioneering image processing software company that served as a key strategic partner of Esri for more than 25 years.



Scott Morehouse is Director, International Research and Development Centers, Esri. He studied at a variety of schools, finally completing an interdisciplinary degree in Geography, Ecology, and Computer Science from Hampshire College in 1977. Scott worked as a research associate in the Laboratory for Computer Graphics and Spatial Analysis, Harvard School of Design, from 1977 to 1981. He worked on the Odyssey project along with Denis White, Nick Chrisman, James Dougenik, and others. He was responsible for the development of the Polyps thematic mapping program and for the preparation of Odyssey for broad distribution as a software package. In 1981, Scott joined Jack Dangermond and Esri in Redlands, California. Scott led the development of GIS software at Esri, building several generations of technology and growing a capable team of programmers and system designers in support of an active and engaged community of users.

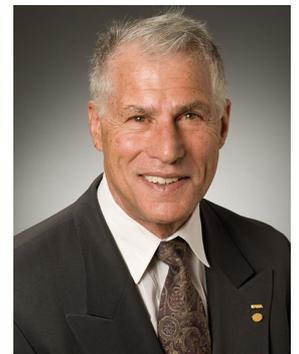


Donald S. Shepard, Ph. D is Professor at the Schneider Institutes for Health Policy at the Heller School, Brandeis University. Director of the Institutes' Cost and Value Group, he is a health economist concerned with maintaining and im-

proving health the United States and internationally. His major concentrations are cost and cost-effectiveness analysis in health and health financing. His studies are supported by government agencies (e.g. CMS and NIH), foundations (e.g. Gates) and international agencies (e.g. World Bank). With incentives and value-based purchasing, he has evaluated randomized trials of the cost-effectiveness of two pay-for-performance (P4P) interventions in substance abuse treatment in the US, and has led international evaluations of P4P in the Republic of Congo, Rwanda and Haiti. Focus areas include cardiovascular disease, HIV/AIDS, dengue, malaria, vaccines, pharmaceuticals, and vector control. He co-authored the paper that first developed the acronym QALY (for Quality Adjusted Life Year). He is also an adjunct faculty member at Brown University. He is the author of 175 professional publications, including 3 books.



Eric Teicholz is president and founder of Graphic Systems, Inc., a Lexington-MA firm specializing in facility management and real estate automation consulting. He is the author/editor of 12 books on these subjects. He is a Fellow of the International Facility Management Association; chair of IFMA's sustainability Strategic Advisory Group; a member of the Standards Committee, a recent member of the Board of Directors and an advisor to the Commonwealth of MA Integrated Facility Management and Advanced Energy Group's initiatives. He is an Associate Professor emeritus at Harvard University's Graduate School of Design and was Associate Director of the GSD's Lab for Computer Graphics and Spatial Analysis.



Michael Woldenberg came to the Lab in 1967 to work on Bill Warntz's ONR grant, Geography and the Properties of Surfaces. Ernie Lindgren, whose specialty was n-dimensional geometry, was funded by the same grant. In my research

I sought (and continue to seek) explanations by comparing forms and processes from geomorphology or geography to those from biology and physiology and vice-versa. This reflects a 50 year interest in hierarchical scaling laws, allometry and growth models for cities, rivers, blood vessels, airways, brain cells and trees. The scaling laws were based on Christaller's hexagonal partitioning of space and Strahler's stream morphometry. I also used minimum transport-cost models to determine the "cost principle" that governs the branching geometry of blood vessels. While at Harvard, Steve Gould and I began the Philomorphs, a group which met monthly to hear papers on form. Geoff Dutton, Ranko Bon and Peter Stevens participated. From 1975 until 2008 I taught physical geography, geomorphology and the history of geographic thought at the University of Buffalo. My research continues in retirement.



REFLECTIONS

Welcome

Alan M. Garber

Alan M. Garber, MD, PhD is Provost of Harvard University and the Mallinckrodt Professor of Health Care Policy at Harvard Medical School, a Professor of Economics in the Faculty of Arts and Sciences, Professor of Public Policy in the Harvard Kennedy School of Government, and Professor in the Department of Health Policy and Management in the Harvard T.H. Chan School of Public Health.



AAG Recognition

Doug Richardson

Douglas Richardson is the Executive Director of the Association of American Geographers (AAG). Prior to joining the AAG, Dr. Richardson found-

ed and was the president of GeoResearch, Inc., a private research firm specializing in the environmental and geographical sciences. His current research interests range from GIScience and Health to Geography and the Humanities. He has served on numerous private, public, and NGO boards and committees, including currently the National Geospatial Advisory Committee, chairing its Geolocational Privacy subcommittee.



Panel I: Histories

Nicholas Chrisman, Jeremy W. Crampton, John W. Hessler, Patrick McHaffie, Matthew W. Wilson

Moderator: Peter Bol

Navigating the perils of first person history: Lessons from Charting the Unknown

Abstract: *Nine years ago, a book titled Charting the Unknown: How computer mapping at Harvard became GIS was published by ESRI Press. It had the following abstract:*

There are many stories about the origins of geographic information systems technology. A few of them are true. But no matter which story you hear, if you probe a little bit, you will find a connection to the Harvard Laboratory for Computer Graphics and Spatial Analysis, where, beginning in 1965, planners, geographers, cartographers, mathematicians, computer scientists, artists, and many others converged to rethink thematic mapping, spatial analysis, and what is now called GIS.

This presentation reflects on writing this account in the first person, a venture with many pitfalls. Despite the risks, the goals of history may be well served by engaged first person narratives that recognize the risks.

Nicholas Chrisman - see page 4

The Biopolitical Origins of GIS?

Abstract: *In this presentation I examine the possibility and implications of understanding GIS as having biopolitical origins. On this view mapping and GIS*

are constituted as technologies of governance that necessarily enroll specific geographical knowledges (ie., those that are calculable, can circulate, and are computationally tractable). Examples are offered from Arthur Robinson's Map Division of the OSS during WWII, the Chilean government's "Cybersyn" project under President Allende in the early 1970s, and today's geographical intelligence (GEOINT) and drone deployments. A major question about these historical moments, however, is the changing role of the state. Whereas in WWII and in Chile government directly funded and directed mapping and spatial data acquisition, today under neoliberalism we see commercial interests become paramount. While today's GIS and geospatial markets might appear to trump the state, I suggest in fact they exist as complex assemblages of public, private, and academic interests that we need to trace out.

Jeremy W. Crampton works on the intersections of critical cartography/GIS and political geography. I'm interested in mappings, security, and political geographies. More broadly I work on critical mapping (including the geoweb) as offering alternatives to the surveillant security state. I co-founded the New Maps Collaboratory at University of Kentucky. One piece of this is the history of mapping and geographical intelligence (GEOINT). How does governmentality enroll geographical knowledges, and how does it produce mapping and GIS as technologies of government? I draw on the work of Michel Foucault to gain insights into these questions, especially on surveillance and biopolitics. A second piece is how today Big Data are framing the contours of our lives in the age of the algorithm. What is the genealogy of the algorithm and especially its relation to calculability that might help us better understand geotechnology, Big Data and geolocational practices?



Searching for Bunge: The History of Computer Cartography and GIS Project at the Library of Congress

Abstract: Over the last decade the Library of Congress has engaged in a large scale program to collect, preserve, and to make available to scholars the most important materials related to the birth of computer cartography and GIS. This program has collected critical archival collections from some of the founders of the discipline like Roger Tomlinson and Nicholas Chrisman, along with other lesser known collections from places like the US Census Bureau, NASA and the United States Geological Survey. This talk will describe some of these collections, the preservation program at the Library of Congress, and talk about some of the surprising and lesser known mathematical and philosophical influences found within these collections.

John W. Hessler is a Specialist in Modern Cartography and Geographic Information Science at the Library of Congress and a lecturer in Cartography, GIS and Computer Visualization in the Graduate School of Advanced Studies at Johns Hopkins University. The author over one-hundred articles and books, he is also the founder of The Scaling Lab, a cartographic and mathematical collective that uses the theory of complex adaptive systems and cellular automata to study geographical phenomenon and social networks. Much of his research has concentrated on the computer modeling and mathematical analysis of historical spatial networks where he has developed new techniques for historical map geo-rectification and network shape analysis. His mathematical studies of early mapmaking have been featured in numerous national media outlets including the New York Times, Washington Post and most recently in Discover Magazine (June 2014). An avid traveler and mountaineer, Hessler is a regular contributor to the climbing and exploration journal *Alpinist* and is currently at work on the forthcoming books, *Map: the art of perspective*, (Phaidon, September, 2015) and *Cartography's Final Frontier: the Mapping of the Human Brain*, to be published in 2016.



Almost Famous: a computer cartography conference at Northwestern University, 1970

Abstract: In spring 1970, an early conference concerned with computer-aided cartography was held at Northwestern University in Evanston. Organizers included (among others) Howard Fisher of the Laboratory for Computer Graphics and Spatial Analysis (LCGSA). A reading of the conference proceedings provides an opportunity to consider the portability of written and spoken language that had become normal at the lab into other settings. The conference was a return for Fisher to the place where he had conceived the SYMAP program, and can be seen as a sign of its significance in the development of computer-aided cartography.

Patrick McHaffie (Ph.D. Kentucky, 1992) is an associate professor in the Department of Geography at DePaul University. He came to DePaul in 1996 after appointments at the Kentucky Geological Survey, West Virginia, Dartmouth, and West Georgia.



His work has included the social history of cartography and GIS, the cartographic labor process, cartographic ethics, the geography of education spending and Appalachian social geography, the social construction of the global, as well as work on automation as policy and ideology in the United States during the cold war. Over the past ten years (working with anthropologist Howard Rosing) he has developed and conducted two study abroad programs (Kenya and Dominican Republic) that combine GIS and community mapping with food security.

The Opportunity of 1948

Abstract: The origin stories that surround geographic information systems focus in on the 1960s, as a period of intense advancements in computer supported cartography. In these short comments, I consider one site of such innovation: the Harvard Laboratory for Computer Graphics (and Spatial Analysis), founded by Howard Fisher in 1965, but read through the openings created by the closure of the geography program

at Harvard in 1948.

Matthew W. Wilson is an assistant professor in the Department of Geography at the University of Kentucky and a visiting scholar at the Center for Geographic Analysis at Harvard University. He has previously taught at the Harvard Graduate School of Design, and his current research project focuses on the founding of the Laboratory for Computer Graphics at Harvard in 1965, a catalyzing moment in the advent of the digital map. He holds a PhD in Geography from the University of Washington.



PROJECTIONS

The Lab & Geography

Trevor Barnes

The Harvard Lab and American Post-War Geography

Abstract: This paper sets the Harvard Lab within the context of the intellectual changes occurring within American post-War social sciences, and especially in human geography that from the mid-1950s experienced a “quantitative revolution” that included the use of computerization. Harvard had dropped geography as a discipline in 1948, its President, James Conant, concluding that “geography was not a university subject.” In 1966, however, Harvard hired as associate director of the Lab the geographer, William Warntz. Two years later, Warntz became Director, and added to the Lab’s name, “and Spatial Analysis.” Geography had returned to Harvard. Sort of. Warntz had earlier been involved with a movement to revive social physics. As a movement, it perfectly fitted the new post-War American social science ideals of interdisciplinarity, instrumentality, mathematization, and modelling, and yoked to the power of the computer. Warntz brought his social physics perspective to human geography from the mid-1950s, helping to transform American geography into a mainstream social science for the first time ever. His appointment as Director of the Lab should have been his crowning achievement, as well as that of the discipline of geogra-

phy. But this turned out not to be the case.

Trevor Barnes is Professor and Distinguished University Scholar at the Department of Geography, University of British Columbia. He has been teaching at UBC since 1983. He has written on a variety of topics from formal mathematical modelling to American pragmatist philosophy, from Vancouver's video game industry to the history of American geography from the Second World War. He is the author or editor of a dozen books and more than 150 papers and chapters. He was elected Fellow of the Royal Society of Canada in 2011, and Corresponding Fellow of the British Academy in 2014.



Panel II: Legacies

Sara Irina Fabrikant, Michael F. Goodchild, Don Janelle, David M. Mark, David Tulloch, Charles Waldheim

Moderator: Matthew W. Wilson

Computer cartography depicts the world digitally. Do map users understand these displays?

Abstract: Early work in analytical computer cartography dealt with developing methods, algorithms, and tools to digitally represent very rich and complex real-world space-time processes and phenomena on mostly, static 2D digital map displays. This, of course, included the trail blazing research in automated cartography at the Harvard Computer Graphics and Spatial Analysis Lab. Today, responsive geographic information displays on interactive, mobile, and location aware devices are even worn on the body (i.e., smart phones, glasses, watches, fitness trackers, or woven into smart fabrics), and are increasingly used for real-time space-time decision making on the go. Even though geographic information displays form an integral part of human activities, we still lack fundamental understanding if, how, and when, such displays support effective and efficient spatio-temporal decision making and action, and for whom, especially in increasingly emotionally charged and collaborative decision contexts. In this talk, I report on ongoing developments in dynamic and mobile cartography in the

context of early analytical computer cartography work at the CGSAL.

Sara Irina Fabrikant is a Professor of Geography, and the appointed Head of the Geography Department at the University of Zürich (UZH) where she also heads the Geographic Information Visualization and Analysis Group at its GIScience Center. She is the elected chair of the ICA Cognitive Visualization Commission. Her research and teaching interests lie in geographic information visualization and geovisual analytics (geoVA), GIScience and cognition, including dynamic cartography. She has been/is the program co-chair of various top-tier GIScience conferences (e.g., AGILE 2008, GIScience 2010, CartoCon 2014, COSIT 2015, etc.). She has made various presentations at national and international professional meetings, including invited keynotes and other lectures at universities across Europe, North America, Asia, and New Zealand. Other service includes functions with the Association of American Geographers, the International Cartographic Association's Commission on Geovisualization, the North American Cartographic Information Society, and the Swiss Society of Cartography.



Beyond the SYMAP Ruler: The Profound Legacy of the Lab

Abstract: The Lab first achieved prominence with SYMAP. Although several notable advances were included, such as the spatial interpolation algorithm, the Lab's fundamental contributions came later, in the form of efficient algorithms for standard GIS operations (in ODYSSEY), the papers in theoretical geography spearheaded by Warntz, and the conferences that cemented an emerging research community, most obviously the conference on Topological Data Structures of the late 1970s. I present a personal assessment of these advances and their impacts.

Michael F. Goodchild is Emeritus Professor of Geography at the University of California, Santa Barbara, where he also holds the title of Research

Professor. He also holds an affiliate appointment in the Department of Geography at the University of Washington. Until his retirement in June 2012 he was Jack and Laura Dangermond Professor of Geography, and Director of UCSB's Center for Spatial Studies. He received his BA degree from Cambridge University in Physics in 1965 and his PhD in geography from McMaster University in 1969, and has received four honorary doctorates. He has published over 15 books and 500 articles. His research interests center on geographic information science, spatial analysis, and uncertainty in geographic data.



The Unpublished Works of William Warntz

Abstract: *Unpublished works of Bill Warntz (Director of Harvard's Laboratory for Computer Graphics and Spatial Analysis, 1966-71) offer clues to his trajectories in geographic thinking. Distances in the Man-made Environment (a consolidation of macro-geography), Geography the Innocent Science (co-conceived with, and authored by, William Bunge in the 1960s), and Place Names, Probabilities, and Priorities (linking cultural literacy to geographical understanding) are book-length manuscripts. Warntz envisioned additional books: "Geographical Verisimilitudes" (essays on geographical puzzles and paradoxes); "The Shape of the Earth – the History of the Idea" (reviewing everyday experiences and the discriminatory power of evidence); "Geography Of and For the Educational Establishment" (the university's role within its region and the place of imagination and values as expressed in faculty activities and student accomplishments); "The Growth of the North American Economic System" (how flows of money, information, ideas, people, raw materials, and commodities structure the human organization of space); and "Theoretical Geography and Global-Global Patterns (sic) with Examples from Physical Geography" (measures of continentality represented as continuous surfaces of pressure, topographic patterns, and networks).*

Donald Janelle is Professor Emeritus (University of Western Ontario); Researcher Emeritus (University of California, Santa Barbara); PhD,

Michigan State University. Janelle's research and publications are based broadly within geography and affiliated social and behavioral sciences. Primary themes include space-time analyses of individual behavior, the time-geography of cities, the temporal-spatial ordering of social systems, locational conflict analysis, social issues in transportation, and the role of space-adjusting technologies in structuring new patterns of social and economic organization. Janelle has authored more than 130 journal articles and book chapters, and has co-edited six books, including *Information, Place, and Cyberspace: Issues in Accessibility; Spatially Integrated Social Science; and Space in Mind – Concepts for Spatial Learning and Education*. He is a recipient of the Edward L. Ullman Award for Career Contributions to Transportation Geography and the Ronald F. Abler Honors Award for Distinguished Service from the Association of American Geographers. More information at <http://www.spatial.ucsb.edu/janelle>.

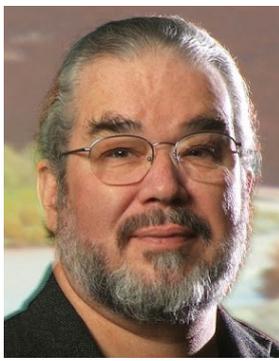


From SYMAP to Topological Data Structures: 1969-1978, a decade of distant influence from the Harvard Lab

Abstract: *The Harvard Laboratory for Computer Graphics and Spatial Analysis played a pivotal role in the early development of what we now call GIS, GIScience, and the spatial sciences. The lab developed and distributed software, conducted research in theoretical geography, and served as a drop-in center and informal clearinghouse for key innovations in GIScience. In this talk, I will present brief personal recollections of how the Harvard Lab had profound influences on my intellectual and professional development, mainly in the decade from 1969-1978, and mostly through my advisor and mentor, Thomas K. Poiker (formerly Peucker).*

David M. Mark is a SUNY Distinguished Professor Emeritus in the Department of Geography at the University at Buffalo (UB), the State University of New York. He retired in 2013. Mark's Ph.D. at Simon Fraser University was supervised

by Thomas K. Poiker and funded by an ONR grant. Mark served as Director of the Buffalo site of the NC-GIA from 1995 until his retirement. Mark served as PI/PD for Buffalo's two NSF-funded Integrative Graduate Education and Research Traineeship (IG-ERT) projects in Geographic Information Science. Mark has written or co-authored more than 250 publications, including 85 refereed articles and 8 edited books. He has made more than 260 academic presentations, more than two thirds at professional meetings, and the others as invited talks at universities and government agencies. Mark has been named the UCGIS Researcher of the Year (2004), UCGIS Educator of the Year (2009), a UCGIS Fellow (2010).



Innovating Across Disciplinary Boundaries

Abstract: *One of the important legacies of the Computer Graphics Lab has been the breadth of impact by its countless innovations. The unique positioning of the lab fostered in its innovators an attitude of exploration and creativity that produced much more than simple engineered solutions. Both the leaders and staff also embraced the diffusion of their ideas through workshops and materials that were widely accessible for the time. Today the many disciplines represented by the University Consortium for Geographic Information Science (UCGIS) have all benefited from that early work. This presentation will connect some of those key innovations with their beneficiaries in the GIScience community.*

David Tulloch is an Associate Professor in Landscape Architecture and the Associate Director of the Center for Remote Sensing and Spatial Analysis in the School of Environmental and Biological Sciences at Rutgers, The State University of New Jersey. He holds a B.S.L.A. from Kentucky, M.L.A. from LSU and a Ph.D. in Land Resources from Wisconsin-Mad-



ison. Dr. Tulloch's interest in multidisciplinary applications of geographic information systems (GIS) has manifest itself through mapping and analysis of spatial patterns of childhood obesity in New Jersey cities, investigations of potential uses of crowdsourced geographic data, and studies of local government geospatial data sharing practices. Much of his teaching and research falls under the umbrella of the emerging field of Geodesign.

Landscape Architecture as Digital Mapping: the Case of Dr. Kongjian Yu

Abstract: *This paper opens with a brief account of the origins of landscape architecture and its formative disciplinary and professional role in Fisher's Lab. The paper describes in greater detail the impact of the Lab's research on the intellectual formation of one particular doctoral student at the GSD, Kongjian Yu. The paper surveys the impact of the Lab through the transfer of knowledge on digital mapping in landscape architecture from the GSD to practices of ecological planning in contemporary China.*

Charles Waldheim is a Canadian-American architect, urbanist, and educator. Waldheim's research examines the relations between landscape, ecology, and contemporary urbanism. He is author, editor, or co-editor of numerous books on these subjects, and his writing has been published and translated internationally. Waldheim is John E. Irving Professor and Chair of Landscape Architecture at Harvard University's Graduate School of Design. He has lectured internationally and has taught at Rice University, University of Toronto, University of Pennsylvania, and the University of Michigan. Waldheim is recipient of the Rome Prize Fellowship from the American Academy in Rome; the Visiting Scholar Research Fellowship at the Study Centre of the Canadian Centre for Architecture; the Cullinan Chair at Rice University, and the Sanders Fellowship at the University of Michigan.



TRANSFORMATIONS

Panel III: Future Present

Hugh Keegan, Ben Lewis, Robert Gerard Pietrusko, Dana Tomlin, Sarah Williams
Moderator: Stephen Ervin

A GIS “expert” gets “educated” on the “system” part of Geographic Information System while working on Ebola at the WHO

Abstract: At the height of the Ebola epidemic in 2014, a few GIS “experts” were brought onsite at the World Health Organization’s HQ, to help support their GIS and epidemiological efforts. A brief summary of the hurdles the WHO faced with their basic GIS operations and a discussion of some of the technical and practical issues encountered. A few thoughts about the limits of the technology currently available and some speculations about the success of new geospatial technologies in the context of a Geographic Information “System” in a crisis. Are there situations when an appropriate technology, really isn’t?

Hugh Keegan was introduced to GIS while working at Oak Ridge Natl. Laboratory in the mid 70’s and told the place to learn more, was at the GSD in the Landscape Architecture program, specifically because of its connection with the Lab for Computer Graphics and Spatial Analysis. I am extremely grateful to have been a student of Carl Steinitz, Dave Sinton and Dana Tomlin. Eric Teicholz and Allan Schmidt were kind enough to hire me after graduation as a Research Analyst at the LCGSA. I joined ESRI in 1982, doing GIS project work, and helped form the Applications Prototype Lab there in 1984. This group performs applied R&D work, mostly for NGOs, and represented ESRI in the head to head competitions that characterized the adoption of GIS technology in its early commercial days. We’ve developed hundreds of prototypes for organizations as diverse as the Jane Goodall Foundation to the JPL.



The Harvard CGA: A Platform to Promote Geospatial Solutions in Higher Education

Abstract: Ben will discuss the approach CGA has evolved over the past 10 years to promote geospatial solutions within higher education. The CGA stands on the shoulders of research labs like Harvard’s Laboratory for Computer Graphics, and on many other academic and commercial innovators around the world, with the practical goal of providing scholars with access to the most pertinent set of geospatial technologies and training given the scholar’s goals.

Ben Lewis is system architect and project manager for WorldMap, an open source infrastructure that supports collaborative research centered on geospatial information. Before joining Harvard, Ben was a project manager with Advanced Technology Solutions of Pennsylvania, where he led the company in adopting platform independent approaches to GIS system development. Ben studied Chinese at the University of Wisconsin and has a Masters in Planning from the University of Pennsylvania. After Penn, Ben helped start the GIS Lab at U.C. Berkeley, founded the GIS group for transportation engineering firm McCormick Taylor, and coordinated the Land Acquisition Mapping System for South Florida Water Management District. Ben is especially interested in technologies that lower the barrier to spatial technology access.



Cartographic Immersion Across Scales

Abstract: Management, Speculation, Design, Debate, Communication – Geographic Information Systems have given us tools to spatialize these fundamental acts. Beyond the tools themselves, and perhaps more importantly, GIS has inspired a culture of geospatial awareness and imagination where an increasing number of people understand complicated processes as being spatially determined and operating at a variety of geographic scales. While there is much interest in the important relationship between geospatial data and the world it represents, this paper will focus on the above-mentioned awareness and imagination pro-

duced by maps themselves in relationship with their viewer, and specifically how this relationship might inspire the public towards a new engagement with their world.

As case studies, I will present a series of immersive cartographic installations I have designed over the last ten years in the museum and gallery context. Through these projects, I will explore how data-driven story-telling at vast spatial and temporal scales can be made intuitive and haptic at the scale of the human body. By giving cartography the task of immersion, one is able to explore a wide range of multi-sensory and visceral forms of communication far beyond the normally stated goal of "legibility." Acknowledging that cartography has historically inspired a public by denoting the unknown, the obscure, the opaque – the terra ingonita, cartographic immersion recovers all of these affective techniques to inspire a public that is curious and engaged in the world's spatial processes both intellectually and emotionally, with the belief that the mobilization of these sensibilities in concert is what truly embeds people in the world and its dynamics.

Robert Gerard Pietrusko is an assistant professor of Landscape Architecture and Urban Planning at the Harvard University Graduate School of Design. His research and teaching focuses on geographic representation and simulation, as well as the history of spatial taxonomies and remote vision. He is the principal of Warning Office— an experimental cartographic practice. His work has been exhibited at the MoMA, SFMOMA, The Foundation Cartier, and the ZKM Center for Art and Media, among others, and has been featured in *Metropolis*, *Architectural Record*, and *Domus*. <http://www.warning-office.org/>



Mapping What Isn't Quite There

Abstract: It's a title that could well have been used to introduce musings about the future of raster-based GIS. I will resist that temptation, however, in favor of something more fundamental and about which I feel more qualified to comment. You guessed it: twinkles in the eye ... those that were there in Cambridge sever-

al decades ago, those that have often (but not always) been evident in the years since, those I certainly see today, and those that I fully expect to see on more - and more varied - faces in the future. Cultivating interest in geospatial information technology on the part of prospective students is easy; right? Of course it is, except when it isn't. So what distinguishes one from the other? I have my own ideas, and I suspect you do as well. So we should talk; I'll use my time to try to get that conversation started.

Dana Tomlin has managed to avoid real work for several decades now by instead pursuing a hobby that was first acquired on the upper floors of Gund Hall. Among those willing to tolerate his preoccupation with the modeling of continuous geospatial phenomena over the years have been several academic institutions (Harvard, Ohio State, Penn, Yale), some non-academic enterprises (Azavea, ERDAS, ESRI, Google, ...), an unsuspecting public (NASA, NSF, USDA, ...), a discerning wife (Sam, who also haunted those upper floors in the mid-70s), and an inspiring son (Mat, who is about to pursue his own irrational passion as a career). Dana now works plays in New Haven and Philly but still comes home to all that rural New England has to offer.



Sourced City: Visual City

Abstract: Mobile devices, civic technology, and social media allow for the creation of innovative approaches towards collecting and visualizing new forms of urban data to describe and expose city patterns. Personal devices can be easily re-purposed into individual data collection tools that allow advocates, researchers, and organizations to harness the power of information in order to transform policy conversations. The Civic Data Design Lab at MIT engages with these new tools, data, and resulting visualizations to generate new planning initiatives, policy debates and design proposals transforming the way we see the urban environment. Drawing examples from the Lab Williams will explore the potential of these new systems to be integrated in the work of planners, architects and pol-

icity experts to make informed decision about the city, using data which comes at a temporal and spatial scale that was previously unavailable .

Sarah Williams is an Assistant Professor of Urban Planning and the Director of the Civic Data Design Lab at Massachusetts Institute of Technology's (MIT) School of Architecture and Planning School. The Civic Data Design Lab works with data, maps, and mobile technologies to develop interactive design and communication strategies that bring urban policy issues to broader audiences. Trained as a Geographer, Landscape Architect, and Urban Planner, Williams work combines geographic analysis and design. Williams' design work has been widely exhibited including work in the Guggenheim and the Museum of Modern Art (MoMA) in New York City. Before coming to MIT, Williams was Co-Director of the Spatial Information Design Lab at Columbia University's, Graduate School of Architecture Planning and Preservation (GSAPP).



Closing Remarks

Jason Ur

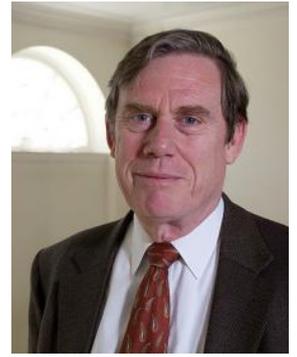
Jason Ur is Professor of Anthropology in the Department of Anthropology at Harvard University, and director of its Center for Geographic Analysis. He specializes in early urbanism, landscape archaeology, and remote sensing, particularly the use of declassified US intelligence imagery. He has directed field surveys in Syria, Iraq, Turkey, and Iran. He is the author of *Urbanism and Cultural Landscapes in Northeastern Syria: The Tell Hamoukar Survey, 1999-2001* (2010). Since 2012, he has directed the Erbil Plain Archaeological Survey, an archaeological survey in the Kurdistan Region of northern Iraq. He is also preparing a history of Mesopotamian cities.



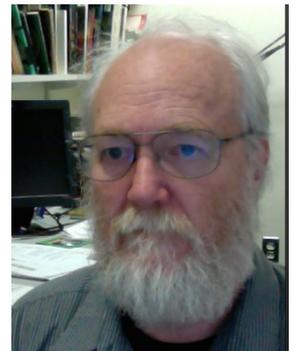
Panel Moderators

Peter Bol, Stephen Ervin, Matthew W. Wilson

Peter Bol is the Vice Provost for Advances in Learning and the Charles H. Carswell Professor East Asian Languages and Civilizations. He led Harvard's university-wide effort to establish support for geospatial analysis in teaching and research; in 2005 he was named the first director of the Center for Geographic Analysis. He also directs the China Historical Geographic Information Systems project, a collaboration between Harvard and Fudan University in Shanghai to create a GIS for 2000 years of Chinese history, and is involved in other projects aimed at enhancing digital information linkages between East Asian and Western scholars.



Stephen M. Ervin is the Assistant Dean for Information Technology at the Harvard University Graduate School of Design, and a Lecturer in the Department of Landscape Architecture, where he has taught since 1989. Ervin teaches and conducts research in the areas of design, computing, media and technology, with a special interest in landscape modeling and visualization, and the integration of CAD, GIS and emerging technologies including GeoDesign. The founding chairman of the American Society of Landscape Architects' (ASLA) Open Committee on Computers in Landscape Architecture and a Fellow of the ASLA, he holds a Master's degree in Landscape Architecture from the University of Massachusetts at Amherst and a PhD in Urban Studies from the Massachusetts Institute of Technology. A regular contributor to the International Digital Landscape Architecture (DLA) conference, he has been a prominent player in the development of the theoretical basis for the integration of computing tools and design methods.



Matthew W. Wilson - see page 8

Two GSD Exhibitions

From Drones to Data Portals and Maps: A Brief History of GIS at Harvard Library

Over the past two decades, Geographic Information System (GIS) has become an integral part of many academic disciplines. This installation showcases the many different ways Harvard Library provides GIS services to students and scholars. This exhibit illustrates the innovative research, teaching, and learning support that libraries provide in an ever-changing information environment. Through collaborations and partnerships, librarians create and make accessible new digital collections. April 13 - June 30, 2015. Graduate School of Design (GSD), Frances Loeb Library, Library Bibliography Wall.

“The Lab” and its Legacy

This exhibition showcases computer-generated maps and graphics, both from ‘Then’ and from ‘Now’, surrounded by images, texts, artifacts, and correspondence, mostly from 1965 to 1985, that illustrate the various disciplines, viewpoints, and individuals who contributed to those heady days of experimentation and development. One wall of the exhibition is devoted to works by contemporary researchers and developers, building upon, and going beyond, the foundation laid by “The Lab”, half a century ago. April 9 - May 15, 2015. Graduate School of Design (GSD), Frances Loeb Library, Special Collections.

Map of the Harvard Campus:



Purchase Parking Pass: <https://www2.uos.harvard.edu/cgi-bin/permit/purchase.pl>

The Center for Geographic Analysis (CGA) supports geospatial research and teaching at Harvard University. Website: <http://gis.harvard.edu/>



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Hashtag for the conference: #harvardgis