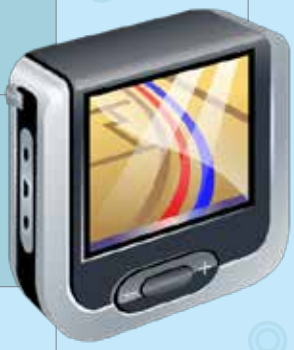
COMPUTING COMMUNITY CONSORTIUM

CCC



FROM GPS AND VIRTUAL GLOBES TO SPATIAL COMPUTING – 2020

www.cra.org/ccc/

NSF

FROM GPS AND VIRTUAL GLOBES TO SPATIAL COMPUTING – 2020

WORKSHOP SUMMARY

Spatial Computing is a set of ideas and technologies that will transform our lives by understanding the physical world, knowing and communicating our relation to places in that world, and navigating through those places.

The transformational potential of Spatial Computing is already evident. From Virtual Globes such as Google Maps and Microsoft Bing Maps to consumer GPS devices, our society has benefited immensely from spatial technology. We've reached the point where a hiker in Yellowstone, a schoolgirl in DC, a biker in Minneapolis, and a taxi driver in Manhattan know precisely where they are, nearby points of interest, and how to reach their destinations. Large organizations already use Spatial Computing for site-selection, asset tracking, facility management, navigation and logistics. Scientists use GPS to track endangered species to better understand behavior and farmers use GPS for precision agriculture to increase crop yields while reducing costs. Google Earth is being used in classrooms to teach children about their neighborhoods and the world in a fun and interactive way. Augmented reality applications are providing real-time place-labeling in the physical world and providing people detailed information about major landmarks nearby.

This workshop outlines an effort to develop and promote a unified agenda for Spatial Computing research and development across US agencies, industries, and universities. See the original workshop proposal here.

The workshop will identify (1) fundamental research questions for individual computing disciplines and (2) cross-cutting research questions requiring novel, multi-disciplinary solutions. The workshop will include US leaders in academia and the public sector. Results of this workshop will be presented to the NSF in order to inform possible funding initiatives

The workshop will include presentations from invited thought-leaders and agency representatives, brainstorming, and interactive demos and focus group sessions with spatial computing professionals.

WORKSHOP AGENDA

Day 1

8:30 AM – 9:00 AM

Opening Remarks, Current Initiatives.
Short overview of the workshop, including goals, agenda, facilities and logistics, etc., from Workshop Chair Shashi Shekhar, University of Minnesota

Welcome from Farnam Jahanian, NSF/CISE Assist. Director
Welcome from Erwin Gianchandani, CCC Director

9:00 AM – 11:00 AM

Push Panel: Spatial Computing (SC) Platform Trends, Disruptive Technologies.
Chair: Dinesh Manocha, UNC
Members:
- Graphics & Vision: John Keyser, TAMU
- Interaction Devices: Steven Feiner, Columbia U
- LiDAR : Avideh Zakhor, UCB
- GPS Modernization: Mark Abrams, DOD/NRO
- Cell Phones: Ramon Caceres, AT&T
- Indoor Localization: Greg Welch, UNC
- Internet Localization: Rajesh Gupta, UCSD
- Cloud Computing: Divyakant Agarwal, UCSB

11:00 AM – 11:30 AM

Break

11:30 AM – 12:30 PM

Breakout Discussions on new SC research opportunities from platform trends.
Breakout groups are GISciences, GISystems, GIServices and Cross-Cutting Areas.

12:30 PM – 1:30 PM

Lunch (Prepare breakout reports)

1:30 PM – 2:00 PM

Breakout Report Back.

2:00 PM – 3:30 PM

Pull Panel: National priorities, Societal Applications of Spatial Computing.
Chair: Henry Kelly, OSTP
Members:
- DOD: Eric Vessey
- DOD: Todd Johanesen
- NIH/NIEHS: Michelle Heacock
- NASA: John Schnase
- DHS: Nabil Adam
- NSF EarthCube: Clifford Jacobs

WORKSHOP AGENDA *CONTINUED*

3:30 PM – 4:00 PM	Break
4:00 PM – 4:30 PM	**Identify cross-cutting SC application characteristics.** M. F. Goodchild (UCSB) & V. Kumar (UMN)
4:30 PM – 5:30 PM	**Breakout Discussions on new SC research opportunities from application trends.** Breakout groups are GISciences, GISystems, GIServices and Cross-Cutting Areas.
5:30 PM – 6:00 PM	**Breakout Report Back.**
6:00 PM – 6:15 PM	**Report Outline, Plan for Day 2.**
6:15 PM – 8:00 PM	Dinner, Keck Center Atrium

Day 2

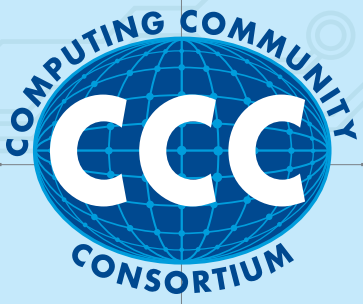
8:30 AM – 9:00 AM	**Recap Day 1, Announcements.**
9:00 AM – 10:30 AM	**Synthesis Presentations on Spatial Computing (SC) research challenges in SCSciences, SCSystems, SCServices and Cross-Cutting Areas.**
10:30 AM – 11:00 AM	Break
11:00 AM – 12:00 PM	**Breakout Discussion to Refine Synthesis Slides.** Breakout groups are SCSciences, SCSystems, SCServices, and Cross-Cutting Areas.
12:00 PM – 1:30 PM	**Lunch & Presentation of Revised Draft.**
1:30 PM – 2:00 PM	**Wrap Up, Post-workshop writing assignments.**

WORKSHOP PARTICIPANTS

Mark Abrams	NRO	mcabrams@comcast.net
Nabil Adam	Rutgers University	nabil.adam@hq.dhs.gov
Peggy Agouris	George Mason University	pagouris@gmu.edu
Divyakant Agrawal	University of California, Santa Barbara	agrawal@cs.ucsb.edu
Mohamed Ali	Microsoft	mali@microsoft.com
Lee Allison	Arizona Geological Survey	lee.allison@azgs.az.gov
Cecilia Aragon	University of Washington	aragon@uw.edu
Walid Aref	Purdue University	aref@cs.purdue.edu
Vijay Atluri	Rutgers University	atluri@andromeda.rutgers.edu
David Balshaw	National Institutes of Health	balshaw@niehs.nih.gov
Budhendra Bhaduri	Oak Ridge National Laboratory	bhaduribl@ornl.gov
Ramon Caceres	AT&T Research	ramon@research.att.com
Kelly Crews	National Science Foundation	kcrews@nsf.gov
Jade DePalacios	NRO	jadeap@gmail.com
Beth Driver	NGA	beth.H.Driver@nga.mil
Jon Eisenberg	NAS/CSTB	jeisenbe@nas.edu
Tom Erickson	IBM	snowfall@acm.org
Michael Evans	University of Minnesota	mevans@cs.umn.edu
Steven Feiner	Columbia University	feiner@cs.columbia.edu
Jie Gao	Stony Brook University	jgao@cs.stonybrook.edu
Erwin Gianchandani	Computing Community Consortium	erwin@cra.org
Michael Goodchild	University of California Santa Barbara	good@geog.ucsb.edu
Sara Graves	University of Alabama, Huntsville	sgraves@cs.uah.edu
Rajesh Gupta	University of California, San Diego	rgupta@ucsd.edu
Myron Gutmann	National Science Foundation	mgutmann@nsf.gov
Susanne Hambrusch	National Science Foundation	shambrus@nsf.gov
Chuck Hansen	University of Utah	hansen@cs.utah.edu
Michelle Heacock	National Institutes of Health	heacockm@niehs.nih.gov
Kenneth Hines	Computing Community Consortium	khines@cra.org
Stephen Hirtle	University of Pittsburgh	hirtle@pitt.edu
Clifford Jacobs	National Science Foundation	cjacobs@nsf.gov
Farnam Jahanian	National Science Foundation	fjahania@nsf.gov
Todd Johanesen	NGA	todd.E.Johanesen@nga.mil
Dan Keefe	University of Minnesota	keefe@cs.umn.edu

Henry Kelly	White House Office of Science and Technology Policy	hkelly@ostp.eop.gov
John Keyser	Texas A&M University	keyser@cs.tamu.edu
Craig Knoblock	USC Information Sciences Institute	knoblock@isi.edu
Benjamin Kuipers	University of Michigan	kuipers@umich.edu
Vipin Kumar	University of Minnesota	kumar@cs.umn.edu
Xuan Liu	IBM	xuanliu@us.ibm.com
Chang-Tien Lu	Virginia Tech	ctlu@vt.edu
Dinesh Manocha	University of North Carolina	dmanocha@gmail.com
Keith Marzullo	National Science Foundation	kmarzull@nsf.gov
Carolyn Merry	The Ohio State University	merry.1@osu.edu
Edward Mikhail	Purdue University	mikhail@purdue.edu
Dev Oliver	University of Minnesota	oliver@cs.umn.edu
Siva Ravada	Oracle	siva.ravada@oracle.com
Norman Sadeh	Carnegie Mellon University	sadeh@cs.cmu.edu
Jagan Sankaranarayanan	NEC Labs	jagan@sv.nec-labs.com
John Schnase	NASA	john.l.schnase@nasa.gov
Lea Shanley	Woodrow Wilson Center	lea.shanley@wilsoncenter.org
Shashi Shekhar	University of Minnesota	shekhar@cs.umn.edu
Jim Shine	U.S. Army Research	james.a.shine@usace.army.mil
Daniel Sui	Texas A&M University	sui@geog.tamu.edu
Virginia Bacon Talati	NAS/CSTB	vbtalati@nas.edu
Paul Torrens	University of Maryland	torrens@geosimulation.com
Raju Vatsavai	ORNL	vatsavairr@ornl.gov
Eric Vessey	NSA	evessey@mac.com
Howard Wactlar	National Science Foundation	hwactlar@nsf.gov
Shaowen Wang	University of Illinois, Urbana-Champaign	shaowen@illinois.edu
Tandy Warnow	National Science Foundation	twarnow@nsf.gov
Nicole Wayant	U.S. Army Research	nicole.m.wayant@usace.army.mil
Mark Weiss	National Science Foundation	mweiss@nsf.gov
Greg Welch	University of North Carolina	welch.ucf@gmail.com
Ouri Wolfson	University of Illinois, Chicago	wolfson@cs.uic.edu
Mike Worboys	University of Maine	worboys@spatial.maine.edu
May Yuan	University of Oklahoma	myuan@ou.edu
Avideh Zakhor	University of California, Berkeley	avz@eecs.berkeley.edu
Maria Zemankova	National Science Foundation	mzemanko@nsf.gov
Li Zhu	National Institutes of Health	li.zhu@nih.gov

NOTES:



THE COMPUTING COMMUNITY CONSORTIUM

Established in 2006 through a Cooperative Agreement between the National Science Foundation (NSF) and the Computing Research Association (CRA), the CCC serves as a catalyst and enabler for the computing research community. Its goals are to unite the community to contribute to shaping the future of the field; provide leadership for the community, encouraging revolutionary, high-impact research; encourage the alignment of computing research with pressing national priorities and national challenges (many of which cross disciplines); give voice to the community, communicating to a broad audience the many ways in which advances in computing will create a brighter future; and grow new leaders for the computing research community.

www.cra.org/ccc/