

# Proposal to Create a Special Interest Group on Broadening Participation in Computing (SIGBP)

Proposal editors

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## 1. Introduction

On behalf of the ACM SIGBP formation committee, we propose the creation of a Special Interest Group on Broadening Participation in Computing (SIGBP).<sup>1</sup> The SIGBP would comprise an international BPC community to reference, support, highlight, and connect the many existing initiatives for broadening participation in computing.

In sections 2 and 3, we briefly motivate the need to broaden participation in computing and summarize some of the many existing BPC activities and communities. In section 4, we describe the proposed SIGBP and answer key questions regarding the SIGBP's: 1) Scope, 2) Primary focus, 3) Primary audience and need to be served, 4) Initial activities, and 5) Overlap with other ACM SIGs. In section 5, we list the SIGBP formation committee members; convey the strong community support for the SIGBP; and summarize excerpts from the endorsements received. We conclude in section 6 with a description of the SIGBP organization and leadership. Appendices A and B respectively include the Figures and Tables referenced herein. Appendix C includes the 18 organizational letters of endorsement for the SIGBP. Appendix D lists the names of the 75 people who signed a petition saying that they may volunteer to serve on the SIGBP organizing committee. The complete list of 300+ people who signed a petition indicating that they support the formation of and would join the SIGBP will be provided upon request.

## 2. Broadening Participation in Computing (BPC)

Computing and Information technology (IT) are driving innovation and economic growth in almost every societal and business sector. Not surprisingly, computing and IT are among the fastest-growing areas of job growth. As such, people who are eligible to work in computing and IT jobs have the opportunity for personal economic prosperity, and, importantly, these people have the opportunity to contribute to innovations with far-reaching global societal consequences, such as healthcare, energy, sustainability, and security. It stands to reason, that the 21<sup>st</sup> century technology workforce should be accessible to all demographic groups and world citizens in developing nations – to provide all people with fair access to gainful employment, as well as to infuse a diversity of talent, creativity and perspectives for shaping future innovations and applications of computing.

However, there have been longstanding disparities in the participation of women, persons with disabilities, and underrepresented minorities in computing<sup>2</sup>. In the United States, the low participation of women and minorities (over 70% of the population) is exacerbating a

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<sup>2</sup> A demographic group is "underrepresented" when the group's participation in computing is less than their representation within the population at large. In the U.S. the following groups are underrepresented in computing: Women, persons with disabilities, African Americans, Hispanics, American Indians, Alaska Natives, Native Hawaiians, and Pacific Islanders, NSF data, <http://www.nsf.gov/statistics/wmpd/>.

misalignment between the education pipeline and workforce needs. For example: Since 2000, the number of students enrolling and graduating from college in domestic computing programs has declined sharply, down by 70% with only recent improvements in enrollments (Fig. 1, Appendix A). Meanwhile, the participation gap in computing has been widening. The participation of women and minorities taking the high school Advanced Placement test for computer science (an indicator of interest in computing) is well below the enrollment of these groups (Fig. 2, Appendix A). Women and minorities are underrepresented among computing college degree recipients (Fig. 3, Appendix A). The lack of parity for degree conferral to women in computing is even worse than for math and science disciplines (Fig. 4, Appendix A). From 1986 to 2005, the percentage of women and underrepresented minorities obtaining college degrees in computing dropped by 4%, while this percentage increased for engineering and science (Fig. 5, Appendix A). Although women comprise 58% of the U.S. professional workforce, they hold only 25% of professional computing jobs and 11% of corporate officer positions in fortune 500 technology companies<sup>3</sup>. Furthermore, 56% of women leave technology companies at the mid-career level<sup>4</sup>. By 2018, there will be 1.4 million computer specialist job openings in the United States, and U.S. universities will have generated enough graduates to fill about 1/3 of these openings<sup>3</sup>. U.S. Information Technology companies cited a shortage of qualified talent as the greatest human capital challenge facing IT companies.<sup>5</sup> Similar sentiments are echoed by Canada and in the U.K.<sup>6</sup>

At least for the U.S., Canada, and U.K., broadening participation in computing (BPC) is essential to meet 21<sup>st</sup> century workforce demands. Globally, BPC is essential to provide economic opportunities for individuals and to infuse a diversity of thought for addressing important societal issues.

### 3. Existing BPC Activities and Communities

In the past decade, a large number of organizations, communities and initiatives have emerged with the overarching goal of broadening participation in computing. The BPC activities carried out by these groups can be categorized in a number of ways, such as: by the discipline housing the BPC activity; by the stakeholders contributing to or participating in the BPC activity; or by the groups that are studied or targeted for engagement in BPC activities, where groups can be further categorized by Kindergarten through workforce juncture and/or by demographic group. Examples of these categorizations of BPC activities are given below:

- Disciplines undertaking or offering BPC activities, e.g.,
  - Computing
  - Engineering
  - Science
  - Education
  - Gender studies
  - Ethnic studies
  - Psychology
  - Sociology
  - Student affairs

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<sup>3</sup> NCWIT By the Numbers, [www.ncwit.org/pdf/BytheNumbers09.pdf](http://www.ncwit.org/pdf/BytheNumbers09.pdf)

<sup>4</sup> Nicole Hardin, "Women Leaving IT Careers in 'Staggering Numbers'" Job Market Today, June 30, 2010, [http://www.hirestrategy.com/job\\_market/feature\\_content.aspx?article\\_id=881](http://www.hirestrategy.com/job_market/feature_content.aspx?article_id=881)

<sup>5</sup> <http://www.pressreleasepoint.com/tech-companies-see-us-talent-shortage-barrier-innovation>

<sup>6</sup> "The IT Talent Gap: Answering Canada's Greatest Human Capital Challenge," <http://speeches.empireclub.org/65309/data>

- Human resources
- Stakeholders in BPC activities, e.g.,
  - Researchers (from the many disciplines) adding to the knowledge of effective practices for BPC
  - Service Providers (e.g., researchers, teachers, faculty, computing professionals) who implement programs to broaden participation
  - Professionals (e.g., teachers, HR professionals, computing professionals) who seek to enroll students or employ professionals in computing
  - Consumers (e.g., underrepresented students or professionals) who are eligible to participate in BPC programs
- Pipeline juncture studied and/or targeted for engagement in BPC activities, e.g.,
  - K-12 education ~ K-5, middle school, high school
  - Higher education ~ community college, four-year college, graduate school
  - Workforce ~ entry-level, mid-career, executive
- Demographic group studied and/or targeted for engagement in BPC activities, e.g.,
  - Women
  - Underrepresented minority group
  - Persons with disabilities
  - First-generation college
  - Lower income
  - Persons in other disciplines

The organizations and communities involved with BPC activities vary widely with respect to services provided and communities served. In the sections below, we broadly categorize and summarize examples of the types of organizations and communities that exist today with an overarching BPC goal. This is not a comprehensive list, but merely examples.

### 3.1 Research

BPC research can be broadly classified as including one or both of the following components:

1. Research that attempts to answer questions related to the reasons for the lack of participation. For example: Why do women with good grades drop out of undergraduate computer science programs? How does self-identity of minority students affect performance in computer science classes? Why do so few women progress to executive ranks in the technology workforce? This type of research often involves user studies to collect data from the population being studied, but does not necessarily involve the application of interventions.
2. Research that attempts to demonstrate effective practices by implementing and assessing novel interventions or by bringing to scale already proven interventions for broadening participation. Example hypothesis tested by this research include: Can the use of robotics or gaming increase children's interest in computing careers? Can pair learning improve academic performance of women in programming classes? Will targeted marketing messages encourage more Latino women to enroll in computer science? Can mid-career mentoring propel more women to executive ranks in the technology workforce? These types of studies often require large-scale user studies that take place at an academic, community, or workplace setting to test hypothesis.

Research that informs BPC efforts is distributed among many disciplines. Examples of publications that include research that informs BPC are listed in Table 4 (Appendix B). For example, BPC research is informed by research that studies attitude, behavior, and cognitive changes in women and minorities with the goal of understanding how indicators such as self-identity affect a persons attitude towards and success in science, technology, engineering and math (STEM) disciplines. This research is found in the *Annual Review of Psychology*, the *Journal of Black Psychology*, the *American Journal of Community Psychology*, the *American Behavioral Scientist*, the *American Sociological Review*, the *American Sociological Association Research Brief*, the *American Educational Research Journal*, and the *Journal of Women and Minorities in Science and Engineering*, among other journals.

BPC research is also informed by research that attempts to identify effective practices that enhance achievement for minorities and women in STEM. This research is found in the *Journal of Negro Education*, the *Journal of Vocational Behavior*, *School Science and Mathematics*, the *College Mathematics Journal*, the *Review of Educational Research*, the *Journal of Higher Education*, and *Educational Studies in Mathematics*, among other journals.

Research that attempts to identify effective practices for student success specifically in the engineering disciplines is found in the *International Journal on Engineering Education*, *IEEE Transactions on Education*, and proceedings of the *Conferences Women in Engineering Proactive Network (WEPAN)*, *Frontiers in Education*, *Software Engineering Education and Training*, among others.

The *Communications of the ACM (CACM)* has published articles on the need to broaden participation in computing. The *ACM Transactions on Computing Education (TOCE)* has published articles on broadening participation in computing education and has published special issues on BPC.

The ACM SIG on Information Technology Education (SIGITE) publishes a peer-reviewed electronic publication called *Research in IT* with a focus on the theories and practices of information technology, including theory and practice of programming, networking, information management, web systems and user-centered design. SIGITE also publishes the *Proceedings of the SIGITE Conference on Information Technology Education*, with a focus on teaching and learning (pedagogy) of IT.

The ACM Special Interest Group on Computer Science Education (SIGCSE) publishes *Inroads*, a quarterly magazine, as well as proceedings from their annual *Technical Symposium on Computer Science Education* and annual *international Innovations and Technology in Computer Science Education (ITiCSE)* conference. SIGCSE publications focus on computer science teaching and education and sometimes include publications on educational practices for broadening participation in education.

Research books on broadening participation in computing have begun to appear, such as *Women and Information Technology: Research on Under-Representation* (MIT Press, 2005); *Unlocking the Clubhouse: Women in Computing* (MIT Press, 2002); and *Stuck in the Shallow End: Education, Race, and Computing* (MIT Press, 2008). Reports on broadening participation in STEM often referenced by the research literature are published by the National Science Foundation, the Computing Research Association, the Computer Science Teachers Association, the National Action Council for Minorities in Engineering, and the College Board.

Although the periodicals mentioned above inform BPC research and sometimes include papers or special issues on BPC research, none serves as a primary reference for broadening participation in computing for people of all ages with consideration given to factors such as curriculum, community programs, social psychology, ethnicity concepts, media messages, public policy, and the workplace environment.

### **3.2 Professional Groups for Women and Minorities**

Several professional organizations exist to support various underrepresented groups, targeting different pipeline junctures and focusing on computing or more broadly on science and engineering. Some examples are described here and listed in Table 1 (Appendix B).

The ACM's Committee on Women in Computing (ACM-W) has a mission "to celebrate, inform and support women in computing, and work with the ACM-W community of computer scientists, educators, employers and policy makers to improve working and learning environments for women." ACM-W sponsors events for students, faculty and practitioners to promote mentoring and role modeling; collect data to monitor the status of women in industrial and academic computing; provide historical information about women's accomplishments and roles in CS; and serve as a repository of information about programs, documents and policies of concern to women in CS. ACM-W offers awards and scholarships and helps people host regional ACM-W conferences or start regional ACM-W chapters, among other things. Many computer science departments have ACM-W student chapters.

The Computing Research Association (CRA) sponsors the A. Nico Habermann award to recognize outstanding contributions towards increasing the numbers or successes of underrepresented groups in computing research. The CRA's Committee on the Status of Women in Computing Research (CRA-W) is dedicated to increasing the number of women participating in Computer Science and Engineering research and education at all levels. The CRA-W sponsors events for faculty and undergraduate and graduate students, including career-mentoring workshops, awards, distinguished lecture series, and disseminates best practices. The CRA-W funds research experiences for undergraduates (REU) through the Distributed REU project (DREU) both in the US and in Canada (through the Canadian DREU Project).

The ACM, CRA and the Institute of Electrical and Electronic Engineers (IEEE) co-sponsor the Coalition to Diversify Computing (CDC). The CDC seeks to develop a diverse community of computing professionals, with a current emphasis on recruitment and retention of minority undergraduates into graduate school programs and ultimate placement into academia and industry. CDC's diverse membership includes students and professionals within academia, industry and federal labs. The CDC sponsors the Tapia Celebration of Diversity in Computing conference, a venue that provides underrepresented college students role models and networking with professionals in industry, government, and academia. The CDC also supports research experiences for undergraduates, career mentoring workshops, student mentors, and sending students to technical conferences. The CRA-W and CDC offer the Collaborative REU (CREU) program as a complement to DREU.

The Black Data Processor Association (BDPA) supports minorities in middle and upper management in the IT sector and undertakes K-12 outreach to build the educational pipeline.

The Natural Sciences and Engineering Research Council of Canada (NSERC) has five regional NSERC Chairs for Women in Science and Engineering that lead initiatives to engage

underrepresented groups in computing, particularly women and the Aboriginal Canadian population.

None of these organizations specifically addresses the collective needs of broadening participation for people of all ages, in various settings, as described earlier. None of these organizations serves as the central voice for BPC or serves as a primary reference for BPC research, education, and practice.

### 3.3 The NSF BPC Alliances

The National Science Foundation (NSF) Broadening Participation in Computing program funded 13 statewide or national alliances and over 100 demonstration projects on broadening participation in computing, as listed in Table 3 (Appendix B) and described in the AAAS report “Telling the Stories of the BPC Alliances: How One NSF Program is Changing the Face of computing.”<sup>7</sup> The alliances include partnerships among academia, K-12, industry and community groups to increase the participation of women and under-represented minorities in computing through a variety of approaches:

- *Georgia Computes!* and the *Commonwealth Alliance for Information Technology Information Education (CAITE)* focus on statewide reform of K-20 computing education in Georgia and Massachusetts, respectively.
- *Into the Loop* focuses on K-12 computing education in Los Angeles.
- The *Alliance for the Advancement of African-American Researchers in Computing (A4RC)* and the *Advancing Robotics Technology for Societal Impact (ARTSI)* Alliance focus on increasing the participation of African-Americans in computing through research experiences (A4RC) and an engaging robotics undergraduate curriculum (ARTSI).
- The *Students and Technology in Academia, Research, and Service (STARS) Alliance* advocates interweaving student-led regional engagement into the undergraduate experience; the *Computing Alliance for Hispanic Serving Institutions (CAHSI)* advocates peer-led team learning; and the *Caribbean Consortium for Computing Excellence (CCCE)* advocates research experiences for high school and undergraduate students--all three with the goals of increasing undergraduate student success and advancement into computing graduate programs, for underrepresented students.
- *AccessComputing* serves as a national network supporting research and activities focused on increasing the presence of persons with disabilities in computing; the *National Center for Women and Information Technology (NCWIT)* does the same for women; and the *Empowering Leadership (EL) Alliance* aims to provide connections among minority computing students who are in majority-serving institutions, nationwide.
- *Widening the Research Pipeline* is a collaboration between CRA and CDC (mentioned earlier) to broaden participation in computing research.
- Lastly, the *Grace Hopper Regional Consortium (GHRC)* supports regional conferences modeled after the national Grace Hopper Celebration of Women and Computing (described below).

Many of the alliances serve as national repositories for dissemination of best practices; offer opportunities, nationally, for students and teachers to participate in conferences, research, and other events; and contribute to BPC research. Since 2006, the NSF hosts an annual BPC

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<sup>7</sup> <http://www.aaas.org/news/releases/2010/0728computing.shtml>

Community meeting that attracts over 300 participants from various sectors to disseminate research and effective practices for broadening participation.

As for the organizations mentioned earlier, none of the NSF Alliances specifically addresses the collective needs of broadening participation for people of all ages, in various settings, and none serves as the central voice for BPC or as a primary reference for BPC research, education, and practice.

### **3.4 National Communities, Coalitions, and Nonprofit Organizations**

In addition to the CDC, there are many other coalitions, communities and nonprofit organizations for broadening participation in computing. Some of these are listed in Table 2 (Appendix B) and described next.

The *Center for Minorities and People with Disabilities in Information Technology (CMD-IT)* serves as a national resource for broadening the participation of women and under-represented minorities in computing. CMD-IT has a mission “to ensure that under-represented groups are fully engaged in computing and information technologies, and to promote innovation that enriches, enhances, and enables these communities, such that more equitable and sustainable contributions are possible by all communities.” CMD-IT seeks to provide a united voice, information resources (such as a calendar of events), leadership initiatives, and support national-scale BPC projects for under-represented groups and people with disabilities.

Two national organizations serve as resources for BPC for women. The *Anita Borg Institute (ABI) for Women and Technology* was established in 1997 to develop tools and programs designed to help industry, academia, and government recruit, retain and develop women technology leaders. ABI sponsors events for women, such as the *Technical Executive Forum* and the *Savvy Geek Chix* initiative. ABI sponsors numerous awards for women (e.g., *Women of Vision Award*, *Anita Borg Award for Social Impact*, *Anita Borg Award for Technical Leadership*, *TechWomen Change Agent Awards*) as well the *Anita Borg Top Company for Technical Women Award*. The signature ABI event is the annual *Grace Hopper Celebration of Women and Computing (GHC)*. Recent GHC’s have attracted over 1500 women from industry, government, and academia, including students. ABI held it’s first GHC in India last year, and collaborates with the Grace Hopper Regional Consortium (mentioned above).

The *National Center for Women and Information Technology (NCWIT)*, one of the NSF BPC Alliances, is also a nonprofit organization focused on women. NCWIT builds national networks through it’s Academic Alliance, Workforce Alliance, Entrepreneurial Alliance, and K-12 Alliance. NCWIT provides a national repository of research-driven practices and outreach resources. The organization offers consulting services to organizations wanting to recruit and retain women, and offers consulting services to researchers through its Social Science Advisory Board. NCWIT sponsors awards, including the *NCWIT Award for Aspirations in Computing* (a national award for high school girls) and supports the offering of regional Aspirations award events.

Once again, none of these organizations or communities specifically addresses the collective needs of broadening participation for people of all ages, in various settings, and none serves as the central voice for BPC or as a primary reference for BPC research, education, and practice.

### **3.5 Education**

The vast majority of the organizations listed in Tables 2-3 (Appendix B) are led by and have

heavy participation by computing faculty in colleges and universities, many in partnership with social science and education faculty, as well as K-12 teachers. For example, the NSF BPC Alliances, as well as the 100+ BPC demonstration projects funded by the BPC program are almost all led by college and university faculty. The *Tapia Celebration of Diversity and Computing*, the *STARS Celebration Student Leadership Conference*, and the *Supercomputing Conference* Broader Engagement Program primarily aim is to involve undergraduate students, with additional participation from faculty leaders and role models. Hundreds of students attend the annual *Grace Hopper Celebration*. The NCWIT's Academic Alliance consists of over 400 people from computer science and IT departments of nearly 200 colleges and universities across the country, spanning research universities, community colleges, women's colleges, and minority-serving institutions.

In the K-12 sector, the *Computer Science Teachers Association (CSTA)* promotes the teaching of computer science and other computing disciplines and includes an emphasis on attracting a more diverse group of students. Many K-12 educators in science and math participate in pipeline initiatives to prepare and motivate women and minority students for computing college majors. Many national non-profit and professional organizations also seek to increase and broaden participation in computing. The *Girl Scouts*, *Citizen Schools*, *National Lab Day*, and others have development programs, curriculums and activities to encompass computing education and broadening participation. NCWIT's K-12 Alliance Members include *4-H*, the *American School Counselor Association*, *Boys & Girls Clubs of America*, *National Girls Collaborative Project*, *Girl Scouts*, and *National Coalition of Girls' Schools*, among others.

### **3.6 Workforce/Corporations**

The business sector is acknowledging the need to broaden participation by sponsoring and participating in numerous initiatives to increase the number of women and under-represented minorities who enter the computing workforce and advance into senior positions. For example, Google, Hewlett Packard, Microsoft, CA Technologies, Cisco, facebook, First Republic Bank, IBM, Intel, Intuit, Lockheed Martin, NetApp, SAP, Symantec, Thomson Reuters, Wilson Sonsini Goodrich & Rosati, Amazon.com, Broadcom, Motorola, Raytheon, Salesforce, and Yahoo! partner with ABI.

Microsoft, Bank of America, Avaya, Pfizer, Merck, EMC<sup>2</sup>, Google, Hewlett Packard, Intel, Motorola, Qualcomm, Kauffman Foundation, Boehringer Ingelheim, and ReturnPath are partners or financial supporters of NCWIT.

Citigroup, General Electric, IBM, JP Morgan Chase, Nortel, and Wachovia are some of the more than 30 corporate clients of INROADS, an organization dedicated to helping businesses gain greater access to diverse talent, including a high demand in the computing and technology sector.

AT&T, IBM, S.D. Bechtel Jr. Foundation, Intel, 3M, Agilent Technologies, Bechtel, Lockheed Martin, SanDisk, Texas instruments, and tyco are just some of the companies who partner with MentorNet, a nonprofit organization that matches professionals in engineering and science with underrepresented students in college for online mentoring, to promote student success.

These and numerous other companies of all sizes partner with K-12 schools, higher education and community organizations to strengthen the educational pipeline leading to the IT workforce. Many companies also undertake their own workplace initiatives to recruit, retain and advance women and minority technology workers. Workplace initiatives include programs for mentoring,



networking and leadership development.

The business sector also provides evidence that problems of broadening participation are not limited to the US market. For example, refer to a recent posting on scholarships offered by Accenture in South Africa, aimed at recruiting South African students to Computer Science, Information Science, Engineering, and related disciplines (<http://bit.ly/pOFn5b>). While there is an obvious business need (with Accenture being a multinational company, there is no doubt that the company wants to attract new professionals in a relatively underserved region to the field—and in the location where the company operates.

### 3.7 Government

Since 1982, the National Science Foundation (NSF) has published a congressionally mandated biennial report on the participation of women and minorities in science and engineering<sup>8</sup>. NSF has long sponsored programs that recruit people, particularly women, minorities and persons with disabilities for participation in science, technology, engineering, and math (STEM). Examples include Advancing female STEM faculty (*ADVANCE*), Research Experiences for Undergraduates (*REU*), Graduate K-12 Fellows (*GK-12*), Integrative Graduate Education and Research Traineeship (*IGERT*), Louis Stokes Alliances for Minority Participation (*LSAMP*), Historically Black Colleges and Universities – Undergraduate Program (*HBCU-UP*), Research on Gender in Science and Engineering (*GSE*), Tribal Colleges and Universities (*TCUP*) program, and many more. These programs aim to increase participation as well as advance research on effective practices - to solve what the National Science Board sees as a “troubling decline” in the number of U.S. citizens studying to become scientists and engineers.

In 2001, the NSF introduced the Information Technology Workforce (ITWF) program calling the “under-representation of women and minorities in computer science and engineering” a “serious national problem” and calling for “systematic research efforts” to address this problem. In 2005, the NSF established the Broadening Participation in Computing (BPC) program “to significantly increase the number of U.S. citizens and permanent residents receiving post secondary degrees in the computing disciplines, with an emphasis on students from communities with longstanding underrepresentation in computing.” The BPC program includes the funding of alliances with multiple stakeholders to “design and carry out comprehensive programs that address underrepresentation in the computing disciplines.” In 2011, NSF introduced the Computing Education for the 21<sup>st</sup> Century (CE21) program to “Increase the number and diversity of K-12 students and teachers who develop and practice computational competencies in a variety of contexts; and Increase the number and diversity of early postsecondary students who are engaged and have the background in computing necessary to successfully pursue degrees in computing-related and computationally-intensive fields of study.”

Furthermore, the NSF requires that all proposed research projects include a “broader impacts” component that can include broadening participation. In 2010, the NSF Computing and Information Science and Engineering (CISE) directorate held the Broader Impacts for Research and Discovery Summit (BIRDS) to call upon computing researchers to strengthen the broader impact of NSF-funded projects, with an emphasis on broadening participation in computing.

The U.S. Department of Education has long held competitions for the Graduate Assistance in Areas of National Need (GAANN) to support a greater number of domestic students, particularly

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<sup>8</sup> Women, Minorities, and Persons with Disabilities in Science and Engineering, <http://www.nsf.gov/statistics/wmpd/>

from underrepresented groups to pursue PhD degrees in STEM disciplines, particularly computing.

The National Security Agency (NSA) is an Anita Borg Institute partner. The Naval Research Laboratory is a MentorNet Sustaining Partner. The NSA, the National Institute of Health, the Department of Defense, the Department of Homeland Security, the U.S. Department of Education, the National Academy of Engineering, the National Aeronautics and Space Administration, and the national labs (e.g., Oak Ridge National Lab, and Lawrence Livermore National Lab) all sponsor programs with goals that include broadening participation in computing.

### **3.8 International Initiatives**

Anne Condon from the University of British Columbia is on the SIGBP Formation Committee and has provided a support letter with this proposal outlining some of the BPC activities in Canada. As in the U.S., a number of Canadian efforts are aimed at increasing women's participation in computing. In Canada, underrepresented minority groups (in computing) include Aboriginal populations. In her letter, Anne also points out "that while several European countries are similar to the U.S. and Canada with regard to low participation of women, others have much higher participation. Opportunities for dialogue across cultural and geographic boundaries would help us sharpen hypotheses on why participation of women and certain ethnic groups in computing is so low, and would strengthen efforts to address the underlying causes."

Even in countries where there is high participation, SIGBP is important to ensure those countries remain healthy in terms of opportunities for underserved groups, especially as they enter the profession, which is increasingly a global workforce. I.e. an individual may be well served in one country and find herself in another country where conditions are different.

Our goal is that the SIGBP would have active international participation. If the SIGBP is awarded probationary status, we will actively solicit much greater international participation to fully inform the evolution of the SIGBP.

### **3.9 BPC Policy**

There are emerging efforts to influence policy-makers as a means to increase the visibility of computer science and broaden the participation in computing. For example, the Computing in the Core initiative<sup>9</sup> is a non-partisan advocacy coalition of associations, corporations, scientific societies, and other non-profits seeking to elevate the national profile of computer science education in K-12 within the U.S. and work toward ensuring that computer science is one of the core academic subjects in K-12 education. NCWIT has been working with ACM, CRA, and the Stern Group (an international advisory firm run by the Honorable Paula Stern), among others, to establish a platform in Washington D.C. that will keep policy-makers apprised of the issues surrounding diversity and innovation<sup>10</sup>.

## **4. Proposed ACM Special Interest Group for Broadening Participation (SIGBP)**

As outlined above, there are many organizations (companies, programs, and activities) aimed at broadening participation in computing. These organizations provide repositories to disseminate

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<sup>9</sup> Computing in the Core Initiative - [computinginthecore.org](http://computinginthecore.org)

<sup>10</sup> Policy Advocacy - <http://ncwit.org/work.outreach.html>

effective practices, host events for networking and recruitment, offer professional development and networking, advocate policy change, provide recognition with awards, fund research and programs, and contribute to research related to BPC. These many activities illustrate the existence of BPC communities, but these communities are largely disparate – many with separate pipeline focus (e.g., K-12, higher education, or industry focused), demographic focus (e.g., women, minorities, persons with disabilities), and/or disciplinary focus (e.g., computing, engineering, education, social sciences). Broadening participation in computing requires multiple levels of collaboration, across disciplines, pipeline junctures, and stakeholders.

While there are pockets of central resources, there is currently no single place, especially in a professional sense, where one can find out about all ongoing activities, the opportunities offered, or the outcomes from these activities. For example, many BPC initiatives offer opportunities for student engagement and undertake grass-roots efforts to reach targeted students - while many of these students remain unaware of the plethora of opportunities available to them.

Furthermore, the BPC literature is scattered among journals and conferences within computing, engineering, science, education, and the social sciences. The past decade has brought about an increase in BPC-related research that is led by computing researchers, calling for a publications venue that is more visible to the computing research community.

What is needed is an overarching BPC community to support and highlight the many existing BPC initiatives and a computing research publications venue to provide referencing to best practices and research outcomes. It is our view that the ACM SIGs are a well-recognized model for fostering communities around computing related areas. We propose to create an ACM SIGBP as an international community to support and strengthen the diverse array of initiatives for Broadening Participation in Computing.

#### **4.1 Scope of the Proposed ACM SIGBP**

The scope of the proposed SIGBP is to provide an overarching international community to highlight, support, connect, and strengthen the diverse array of existing BPC communities, activities, and research. The mission, members and goals of the SIGBP are articulated below, with details in the following sections.

The SIGBP **Mission** is to advance innovation and discovery by increasing and broadening participation in computing. The SIG will promote research, technologies, practices and policies for increasing the participation of women, under-represented minorities and persons with disabilities in computing

SIGBP **Members** are researchers, practitioners, educators and policy-makers from academia, industry, government, K-12 schools, and the non-profit sector within a variety of interests, including computing, psychology, sociology, ethnic and gender studies, education, and human resources

SIGBP **Goals** are to foster collaboration, dissemination, and support among organizations, programs and people seeking to broaden participation in computing, including efforts to advance research on the factors behind lack of participation; evaluate and promulgate effective practices for increasing participation; advocate beneficial institutional or government policies; and advance the academic and career development of students and professionals in computing.

The SIGBP will collaborate with other related ACM SIGS, including SIGACCESS, SIGCSE, and SIGITE. The SIGBP will serve as an umbrella organization to support the many existing efforts to broaden participation. These include the efforts of the ACM-W, CRA-W, CDC, NCWIT, ABI, GHC, and the NSF BPC Alliances.

#### **4.2 Primary Focus of the SIGBP**

The primary focus of the ACM SIGBP is fourfold, as follows:

##### **(1) To advance research on the factors behind lack of participation in computing**

The SIGBP will organize peer review of papers related to BPC research for at least one annual SIGBP symposium to be co-located with an existing conference or workshop, such as the Richard Tapia Celebration of Diversity and Computing. Accepted papers will appear in Symposium Proceedings. Extended versions of the best papers will be published in an ACM journal, such as CACM.

As conveyed by the examples in section 3.1 above, BPC research requires multi-disciplinary expertise, including social science research methods, along with a deep understanding of the computing discipline and, often, access to academic or workplace settings for testing of effective practices. Because of this, BPC research is often conducted by interdisciplinary research teams that include (and are often led by) computing researchers. For example, this is the case for all of the 13 NSF BPC Alliances.

An ACM SIGBP will help advance BPC research by providing greater opportunity for computing researchers to publish in a computing venue. This will provide a referencing mechanism to 1) research with an explicit focus on BPC, 2) research on broadening participation in science and engineering that is relevant for computing, and 3) publications in the many disciplines that inform BPC research, such as education, psychology, gender studies, ethnic studies, educational technologies, student services, and human resources. Lastly, ACM SIGBP peer-reviewed publications will make the outcomes of BPC research more visible to computing researchers and practitioners who are not already connected to BPC activities.

##### **(2) To disseminate effective practices for broadening participation in computing**

The SIGBP will provide a central community to find information about organizations, activities, publications, awards, other communities and portals with a BPC mission, such as those reviewed in section 3 above. Examples of BPC practices to be disseminated include models, frameworks and strategies for recruiting and advancing people along the pipeline from K-12 to college to the workforce, including:

- Curricular, extra-curricular, and after-school programs to enhance student achievement in math and science and increase interest in computing college majors and careers
- Programs for Teacher and Guidance Counselor training to enhance the capacity of K-12 schools to broaden participation
- Outreach programs to create positive engagement of students at all levels in the computing disciplines
- Programs that smooth academic transition – from high school to college, from 2- to 4-year postsecondary programs, from undergraduate to graduate education, and from graduate school to the professoriate
- Programs for student participation in enriched research and internships

- Systemic mentoring and mentor training programs for students and professionals
- Social networks and peer support programs for students and professionals
- Innovative methods for career counseling, career placement, and career advancement

SIGBP dissemination will be achieved through a newsletter, an online portal, a digital repository, and by hosting BPC events. The SIGBP newsletter will report on recent activities, advertise future events, and highlight interesting new results, articles, and organizations. The SIGBP portal will provide comprehensive links to BPC organizations, activities, awards, portals and communities, such as those reviewed in section 3. The SIGBP will provide a digital repository of BPC practices that references and augments existing portals, such as the Engineering Pathway portals created for the NSF BPC Alliances (BPCPortal.org), for the NCWIT resources collection (ncwit.org/resources.library.html) and for the STARS practices collection (under development at starsalliance.org).

The SIGBP will host conferences and events that focus on BPC or that have a broader engagement component. This could include the conferences and events reviewed in section 3. The SIGBP could also partner with other ACM SIGs to enhance and promote their broader engagement initiatives.

### **(3) To inform the computing community about policies that may impact BPC**

The SIGBP will seek to inform the computing community about policy issues with potential impact on broadening participation in computing by providing an index to such activities. For example, refer to the discussion above on the Computing in the Core initiative and NCWIT's advocacy and outreach efforts.

### **(4) To advance the academic and career development of students and professionals**

The SIGBP will advance the academic and career development of students and professionals in computing by providing an index to the many opportunities to participate in programs with goals to broaden participation. As outlined in section 3, there are numerous opportunities within industry, government, academia, K-12 or community organizations to participate in programs that particularly emphasize broadening participation. Some examples include:

- Research experiences for undergraduates, high school students, and high school teachers - offered by colleges and universities, industry, and government labs
- Student or faculty internship opportunities offered by industry and government labs
- Travel scholarships to attend conferences
- Opportunities to participate in student poster competitions or student conferences
- Opportunities to participate in career mentoring programs (face-to-face and online) or networking programs
- Opportunities to participate in professional development workshops
- Opportunities to join professional organizations
- Opportunities to have role-model speakers visit your organization or to serve as a role-model speaker or mentor

## **4.3 Primary Audience and Primary Need to Be Served**

SIGBP Members will be researchers, professionals, educators and students from academia, industry, government, K-12 schools, and the non-profit sector within a variety of interests, including computing, psychology, sociology, ethnic and gender studies, education, student

services, and human resources. We classify these members into four categories based upon the stakeholder's interest in BPC, as follows:

### **(1) Researchers adding to the knowledge of effective practices for BPC**

Researchers who conduct research on BPC and in areas related to BPC will benefit from having BPC peer-reviewed periodicals that provide a reference to the BPC literature. As previously stated (sections 3.1 and 4.2, above), research that informs BPC is found in journals and conference proceedings within engineering, science, computing, education, psychology, sociology, and gender and ethnic studies. Increasingly, BPC research is led by computing researchers. Although CACM, TOCE, SIGCSE and SIGITE have published articles related to BPC, none focuses on being a primary reference to the BPC research literature. Particularly missing is a focus on broadening participation in the workforce, raising interest in computing for people of all ages, and research that attempts to answer questions related to the reasons for the lack of participation.

The attached support letter from SIGCSE Chair Renee McCauley articulates the need for SIGBP to support a community of BPC researchers:

*“Although we feel very connected and committed to broadening participation in education, there are important communities that we do not serve and issues that we do not consider. There are issues of broadening participation in the workforce, for example, changing cultures to make it more appealing for people of all backgrounds to work and stay in computing fields. Raising interest in computing for people of all ages, from children to retirees, is not just a computing education effort. Researching methods for broadening participation in computing requires an understanding of a broader base of social science and computing research that overlaps with computing education research but has a different focus. Related to these issues, we believe that there will be great benefit in creating a community of computing researchers that can advance the field of broadening participation through research. There is a need to establish rigor in this research area. There is a need for a community within which those interested in broadening participation can collaborate.”*

We repeat our conclusion from section 4.2 above: ACM SIGBP members will benefit from BPC-focused peer-reviewed publications to provide a referencing mechanism to 1) research with an explicit focus on BPC, 2) research on broadening participation in science and engineering that is relevant for computing, and 3) publications in the many disciplines that inform BPC research, such as education, psychology, gender studies, ethnic studies, educational technologies, student services, and human resources. Furthermore, ACM SIGBP peer-reviewed publications will make the outcomes of BPC research more visible to computing researchers and practitioners who are typically connected to BPC activities.

### **(2) Service Providers who implement programs to broaden participation**

In section 3, we listed examples of the large number of organizations involved in broadening participation in computing. For example, these include the numerous professional groups that provide support for women and minorities (section 3.2); the NSF BPC Alliances (section 3.3); national communities, coalitions, and nonprofit organizations (section 3.4); People in K-12 education and higher education (section 3.5); companies that employ computing professionals (section 3.6); government agencies wanting to produce a larger, more diverse computing workforce (section 3.7); international organizations interested in broadening participation in

computing globally (section 3.8); and people seeking to influence policy that could lead to broader participation (section 3.9). These organizations act as BPC “service providers” by offering programs in schools, in communities, and in the workplace intended to recruit, retain and advance a broader segment of people in computing. The examples given in section 3 include some large, well-publicized conferences, such as the Grace Hopper Celebration of Women and Computing, as well as many smaller, lesser-known efforts such as the 100+ demonstration projects funded by the NSF BPC program.

People in organizations that seek to broaden participation would benefit from the SIGBP as an overarching BPC community to support, highlight, and reference the efforts within the many separate organizations and reference the BPC research literature. The SIGBP would enable BPC service providers to reach a wider audience to advertise opportunities for students, share effective practices, and find collaborators. The SIGBP would be particularly beneficial to the many smaller BPC service providers who do not have the resources to build national recognition of their work. The SIGBP could reduce duplicate efforts, by enabling people to plug into existing efforts before initiating new ones. Finally, the SIGBP could raise the visibility and impact of BPC efforts by providing a unified voice for an international BPC community.

### **(3) Professionals who seek to enroll students or employ professionals in computing**

People in organizations that seek to enroll students in academic programs or hire, retain, and advance employees in the computing workforce will benefit from the SIGBP reference to the many BPC service providers, effective practices, and research outcomes. For example, employers and schools have many opportunities to recruit students by attending and sponsoring BPC conferences and events. Also, employers and schools wishing to implement their own BPC programs, such as mentoring programs, will find proven practices by leveraging the SIGBP reference to the many disparate dissemination repositories.

### **(4) Consumers who are eligible to participate in BPC programs**

Students and professionals who are eligible to participate in BPC programs (i.e., BPC consumers) will benefit from the SIGBP as a central reference to the many opportunities being offered by BPC service providers. For example, in section 4.2 we listed examples of the many opportunities offered to students and professionals (such as REUs, travel scholarships, and professional development workshops). These opportunities are advertised among many disparate websites and using various email lists. As such, many students and professionals remain unaware of the opportunities available to them.

In general, the SIGBP will foster connections within and among the groups of people who conduct research related to BPC, people who implement BPC programs, people who seek to enroll or employ under-represented groups, and people who are part of the under-represented groups who seek to engage in the opportunities provided.

## **4.4 Initial activity to be undertaken by the SIGBP**

The initial SIGBP **Activities** will include:

- Host at least one annual SIGBP symposium, co-located with an existing conference or workshop, such as the Tapia Celebration of Diversity and Computing or the STARS Celebration. Submitted papers will be carefully reviewed, and accepted papers will

appear in the Symposium Proceedings. Extended versions of the best papers will be offered for consideration to an ACM journal, such as CACM.

- Publish a Newsletter that reports on recent activities, advertises future events, highlights interesting and exciting new results and articles, and includes descriptions of member organizations
- Partner with other ACM SIGs to enhance and promote their broader engagement initiatives
- Provide a digital library of BPC best practices (enhancing the library at [bpcportal.org](http://bpcportal.org)) to inform organizations seeking ideas and collaborators for BPC activities.
- Advertise opportunities for students offered within industry, government, academia, K-12 or community organizations seeking to broaden participation (e.g., summer experiences, mentoring, conferences, scholarships)
- Provide a central portal to organizations, activities, publications, awards and other portals with a BPC mission

#### **4.5 Overlap issues with other ACM SIGs:**

A close examination of the ACM SIGs shows that the proposed ACM SIGBP is related primarily to just three of the twenty-seven currently recognized ACM SIGs. These include SIGCSE, SIGITE – each of which targets educators - and SIGACCESS. The scope of the proposed SIGBP as it is envisioned extends significantly beyond the realm of each of them and is intended to be complementary and to allow for powerful synergies and encourage collaborations. The plan for our annual conference is to co-locate with a variety of existing conferences, such as these three groups, Grace Hopper, Richard Tapia, and SACNAS.

As the web site reflects, “SIGCSE, the ACM Special Interest Group on Computer Science Education, provides a forum for educators to discuss the problems concerned with the development, implementation, and/or evaluation of computing programs, curricula, and courses, as well as syllabi, laboratories, and other elements of teaching and pedagogy.” The SIGCSE focus, points out Mark Guzdial, a former SIGCSE Chair, in his *Georgia Computes! Alliance* support letter for SIGBP is limited to the education arena and therefore more narrow in scope than is the proposed SIGBP. “There is a lot of broadening participation research associated with education, and a good bit of it is published at the SIGCSE Symposium and its associated, smaller forums. However, *the broadening participation research that gets published at the SIGCSE Symposium informs introductory computing*. Broadening participation research associated with other areas often doesn’t get into the SIGCSE Symposium, and thus, might not get published at all.”

Along similar lines, SIGITE's mission is similar to SIGCSE but with a special focus on IT education. According to the website, the purpose of SIGITE is to provide a forum for the interaction of practitioners, educators, and others in the field of Information Technology Education in order to exchange ideas and engage in activities that advance the knowledge of its members, the curriculum and teaching on Information Technology Curriculum, and the development and transfer of innovative concepts and applications in technology and pedagogy. SIGITE currently has a focused effort on the development of a model curriculum and guidelines for accreditation. Educators from two- and four-year universities and colleges as well as high school teachers are welcome and would benefit from SIGITE's activities. As is true with SIGCSE, the level of community engagement is more narrowly focused than is our intent.

ACM's Special Interest Group on Accessible Computing, SIGACCESS, promotes the interests of professionals working on research and development of computing and information technology



to help persons with disabilities. They are interested in “the design, development, evaluation, and scientific investigations of technologies to support individuals with disabilities. This includes researchers, clinicians and teachers charged with assessing disabilities, rehabilitation personnel who administer assistive technologies, and policy makers concerned with equitable access to information technologies for people with disabilities. The SIG membership (from both academia and industry) focuses on the application of technologies to serve the needs of persons with, but not limited to vision, motor, hearing, and speech impairments; cognitive limitations, including learning disabilities; and issues of ageing.” Certainly, this focus is on Broadening Participation, but again, the proposed SIGBP extends way beyond the scope and communities served by SIGACCESS, and we look forward to exploring possible synergies with this interest group.

## 5. Community Support for Creating an SIGBP

### 5.1 SIGBP Formation Committee

The formation committee to create an ACM Special Interest Group for Broadening Participation in Computing (SIGBP) was formed in September of 2009, and is shown below.

Name	Institution	BPC Affiliation
Tony Baylis	Lawrence Livermore National Lab	A4RC
Maureen Biggers	Indiana University	A4RC/NCWIT/STARS
Lori Clarke	University of Massachusetts	CRA-W
Ann Condon	University of British Columbia	NSERC
Jan Cuny	NSF CISE Directorate	BPC-A/CE21 Program Director
Teresa Dahlberg	University of North Carolina Charlotte	STARS (Founder)
Kathleen Fisher	Tufts University, formerly AT&T Labs	CRA-W
Ann Gates	University of Texas El Paso	CAHSI (Founder)
Juan Gilbert	Clemson University	A4RC/EL Alliance
Deanna Kosaraju	Anita Borg Institute (ABI)	Grace Hopper Celebration
Richard Ladner	University of Washington	AccessComputing (Founder)
Manuel Pérez-Quirñone	Virginia Institute of Technology	CDC
Lucinda Sanders	National Center for Women in IT	NCWIT (CEO)
Bobby Schnabel	Indiana University	NCWIT/A4RC/Anita Borg Institute
Amy Sharma	Georgia Tech Research Institute	Former AAAS Fellow
George K. Thiruvathukal	Loyola University Chicago	STARS
Gloria Townsend	DePauw University	CRA-W, STARS, ABI
Elaine Weyuker	AT&T Research	ACM-W
Telle Whitney	Anita Borg Institute	ABI (CEO), Grace Hopper Cel.
Bryant York	Portland State University	A4RC/CDC

Committee members include leaders of the ACM-W (Elaine Weuyuker); the Computing Research Association and the CRA-W (Kathleen Fisher and Lori Clark); the Anita Borg Institute for Women and Technology and the Grace Hopper Celebration (CEO Telle Whitney and Deanna Kosaraju); the Coalition to Diversify Computing (Manuel Pérez-Quirñones, Bryant York; Valerie Taylor is not on the committee but has contributed to the planning); the Richard Tapia Celebration of Diversity and Computing (Bryant York, Juan Gilbert; Richard Tapia has also contributed to the planning), and the National Science Foundation (Jan Cuny, formerly Amy Sharma, formerly Teresa Dahlberg). Leaders of the NSF Broadening Participation in Computing (BPC) Alliances are also involved in the formation committee, including the STARS Alliance (Teresa Dahlberg), the Computing Alliance for Hispanic Serving Institutions CAHSI (Ann Gates), AccessComputing (Richard Ladner), the Alliance for African American Researchers in Computing (A4RC) (Maureen Biggers), and the National Center for Women and Information Technology (NCWIT) (CEO Lucy Sanders, Founder Bobby Schnabel).

## 5.2 Endorsement from BPC Organizations

From 2009-2010, the SIGBP Formation Committee held two open forums during NSF Broadening Participation in Computing (BPC) Community meetings. These forums included people involved in numerous organizations and activities related to BPC. The committee drafted the vision, mission, goals, and activities for the SIGBP, based on feedback from these forums and has since continued discussions with key stakeholders. In Fall of 2010, NSF awarded a grant to Teresa Dahlberg and George Thiravathukal to provide two years of support to complete and submit the SIGBP proposal to the ACM and to startup the activities of the SIG, should it be approved by the ACM.

In December 2010, NSF held a meeting of all 13 BPC Alliances (listed in Table 3, Appendix B). During that meeting, the 13 BPC Alliances agreed to support the SIGBP. Please note that these alliance leaders are people involved in many BP related initiatives, beyond the NSF-supported alliances. The BPC Alliances collectively represent national efforts to broaden the participation of women, minorities, and persons with disabilities through effective practices in K-12, higher education, research, corporations, and in collaboration with people in education and the social sciences.

Letters of endorsement for the SIGBP were collected when requesting NSF funding for the SIG and additional letters of endorsement were collected prior to this submission. At the time of this submission to ACM, 16 endorsement letters have been received from leaders of the following organizations. Letters are included at Appendix C.

- ACM SIGCSE
- ACM SIGITE
- AccessComputing
- Alliance for the Advancement of African-American Researchers in computing (A4RC)
- Anita Borg Institute for Women and Information Technology (ABI)
- Advancing Robotics Technology for Societal impact (ARTSI)
- Coalition to Diversify Computing (CDC)
- Commonwealth Alliance for information Technology Education (CAITE)
- Computing Research Association Committee on the Status of Women (CRA-W)
- Empowering Leaders (EL) Alliance and Richard Tapia
- Georgia Computes!
- Grace Hopper Regional Consortium
- Into the Loop
- National Center for Women and Information Technology (NCWIT)
- Natural Sciences and Engineering Research Council of Canada (NSERC)

The **ACM SIGCSE** leadership strongly supports the creation of the SIGBP and has posted a letter of endorsement on their website. The excerpts posted herein (in Section 4.3 part (1), above) provide a sound rationale of support that is written by the SIGCSE leadership.

The **ACM SIGITE** leadership similarly supports the creation of the SIGBP.

*“The mission of this burgeoning organization is important work and will provide a forum to create strategies for increasing the choice of computing as a career for individuals...SIGITE itself has explored these issues but recognize that an entity whose sole focus exists in this space will do a better job...”*

Likewise, **CRA-W's** letter of endorsement makes it clear that their Committee strongly supports the proposal for the formation of a SIG that is focused on broadening participation in computing.

*"We, the Committee strongly support the proposal for the formation of a SIG that is focused on broadening participation in computing. The CRA-W (and CRA) enjoy a strong partnership with ACM (and ACM-W) and participate in ACM activities. This SIG would give the Committee additional opportunities to collaborate with ACM such as co-locating CRA-W workshops at SIG BP conferences and symposiums, increasing the pool of potential program participants by sharing advertising channels, creating a central location for information and best practices for various program interventions and activities (such as mentoring, research programs, and data collection)."*

**Richard Ladner**, Boeing Professor in Computer Science and Engineering, leader of the AccessComputing Alliance, and SIGACT Chair from 2005-2009 cites three important points that indicate "evidence of the demand for the SIGBP" particularly to support BPC scholarship, as follows:

*"First, for the past year I have been co-editing a special issue on broadening participation of the ACM Transactions on Computing Education. The purpose of the special issue is to publish high quality scholarly papers that explore the problem of underrepresentation from an education point of view....we expected perhaps 15 proposals for papers. In the end we received 45 proposals...In my view there was a pent-up demand for people to expose their work in broadening participation to a wider audience. There is a significant group of scholars in computer science and the social sciences who are interested in educational interventions to improve the number of student from underrepresented groups in computing fields.*

*Second, last year I was asked by the Editorial Board of CACM to create a Viewpoints column on Broadening Participation. Since then there have been three Viewpoints articles by some of the most prominent people working on the problem, including Richard Tapia and Valerie Taylor. These three articles have a combined 1,250+ downloads to date. There is considerable interest in broadening participation beyond those active in the area.*

*Third, for a number of years the major organizations in computing, ACM, IEEE Computer Society, and the Computing Research Association (CRA) have placed a high priority on improving diversity within the computing fields. They established organizations such as ACM-W and CRA-W for women and the coalition to diversify Computing (CDC) for minorities. Technically, these are not membership organizations, but are more working groups with specific, mostly non-scholarly, activities. On the other hand, there is a growing group of computer and information scientists and some social scientists who are interested in the 'science of broadening participation.' This group of people creates and evaluates interventions that may or may not improve the participation of women, minorities, and people with disabilities in computing and other fields. There sorely needs to be a membership organization within ACM to sponsor conferences and publication news for people active in this area."*

While all letters of support are presented in full in Appendix C, below are a few selected and representative excerpts from the organizational letters that are worthy of note:

**Coalition to Diversify Computing (CDC):** *"The CDC sees the SIGBP as an excellent complement to our activities. We organize the ACM-sponsored Richard Tapia Celebration of Diversity in Computing Conference, where contributions of the diverse members of the computing field are disseminated and celebrated. We expect that SIGBP will join CDC to continue to build the Tapia conference as the premier conference celebrating Diversity in*

*Computing...We also believe the contributions and results realized from our activities might be published through the archives provided by a SIGBP.”*

**Advancing Robotics Technology for Societal Impact (ARTSI):** *“We are eager to have the ACM SIGBP. With their wide-ranging interests (computing, psychology, sociology, ethnic and gender studies, education, and human resources), ARTSI members will be able to seek out collaborators matching their interests, find useful resources via the ACM SIGBP portal (bpcportal.org), and to publish their broadening participation on one central place.”*

**Richard Tapia and the EL Alliance:** *“An organization that will enable colleagues engaged in this work to learn from others’ experiences, share our successes, and move forward on a national agenda to positively impact minority scholars is an extremely important undertaking. We look forward to being part of an overarching supportive SIGBP community that will strengthen efforts to broaden participation in computing (BPC). We anticipate productive collaboration with other existing BPC organizations, and understand the need for our community to come together as one voice in order to more effectively drive the BPC agenda at a national and international level.”*

**Jane Margolis – Into the Loop:** *“Issues of underrepresentation will not go away by themselves. As the interest in the field is reportedly growing, it is ever more important that intense focus and proactive action be taken to assure representation of all groups in computer science. These issues require skillful strategies to address them. They require interdisciplinary partnerships and investigations. Without this concentrated focus the issue will too likely get pushed to the side, largely because it is so difficult.*

*To assure that this does not happen, I strongly endorse the formation of a SIGBP, which can serve as an umbrella community organization to provide a centralized venue for communication, publication and support for the many existing efforts to broaden participation. The SIGBP is needed to provide a venue to assure that research on underrepresentation continues, that it learns from research in other fields, that best practices are gathered, evaluated, articulated, and disseminated.”*

### **5.3 Endorsement from 300+ Prospective SIGBP Members**

We created an online petition at <http://bit.ly/sig-bp-form> to support the formation of SIGBP. As of 22 August 2011, this petition has been signed by 309 distinct individuals. We asked respondents to check (or not check) one or more of the following boxes:

- I support formation of an ACM SIGBP (309/309)
- An ACM SIGBP would support my work (309/309)
- I would be willing to join the ACM SIGBP (309/309)
- I may volunteer to serve on the SIGBP organizing committee (136/309)

As shown in the parentheses above, all of the 309 individuals indicated agreement that they support formation of the SIGBP; that the SIGBP would support their work; and that they would be willing to join the SIGBP. 136 of these 309 individuals further indicated that they may volunteer to serve on the SIGBP organization committee.

These numbers point to significant interest in the ACM SIGBP. Our response rate was about 62% on the various mailing lists we targeted (i.e., the 309 people that signed the petition represented 62% of the people who opened up the petition link). We find this convincing evidence of a sustainable community for the SIGBP.

Furthermore, it is significant to point out that more than 100 of these endorsers sent comments about the potential value of SIGBP. Below are a few selections from these responses:

A much-needed networking opportunity for people who are passionate about broadening participation - to replace the NSF BP community meetings that are no longer held. Also a publication venue for BP initiatives and results.
Broadening the participation in Computing is one of the top priorities of the CS department at Cal Poly.
I have done a lot of work on promoting the participation of women in computing. This SIG would provide ACM support for that work. A symposium would give a venue for future research. The newsletter would provide a way to get the word out.
SIGBP could help to share ideas to help attract a student population to computing more reflective of the state demographics.
As a first generation college student and technical woman, this new SIG could provide the information necessary to recruit people from similar underrepresented backgrounds
It would be nice to have a consolidated community focused around broadening participation. Right now, publications and people are spread across various other conferences and it's difficult to find and share work relevant to BP.
I'm the chair of a CS department, and my goal is to recruit and retain CS majors from underrepresented groups. The computing community needs SIGBP as an umbrella organization for all of the BPC initiatives sponsored by various organizations, institutions and funding agencies.
This group would offer an even more focused community than SIGCSE for the sharing and refinement of strategies that will broaden the cohort of computer scientists. The inevitable bubble/bust cycle of CS enrollments is at it again, but this SIG addresses the far more persistent problem of attracting people from all walks of life to professions involving computational creativity.
I am very involved in efforts to increase the participation of women and underrepresented minorities in computing throughout the education and workforce pipeline, and SIGBP would be a great asset to such efforts.
I've participated in a number of broadening participation project for several years, and plan to continue to do so... having a sig for the community will be a big help in sharing ideas and practices. I do work in assistive technology and associated research to broaden participation in computing. Having a SIG to support this would be great.
I have done a lot of work in the area and there is not really a vehicle to share best practices, ideas etc. we also need a more widespread effort to really make a difference
As the PI on a NSF CISE BPC Alliance, this is a great forum for interacting with others with similar goals. It would give me a place to describe the outreach work I'm doing and get other CS and STEM faculty involved.
We are actively involved in numerous BPC projects and would welcome an opportunity to network with other like-minded organizations and individuals, and also to share our evaluation findings in a venue such as this.
Broadening participation is a goal of mine and that of all organizations that I belong to. A SIG focused on this would provide a forum for researchers in this area, assuming that a conference or magazine or journal is a product of this SIG.
I imagine that a SIGBP mailing list would benefit me in much the same way as I use the SIGCSE

mailing list - let me connect with others with the same interests and learn about what others are doing to support this work.

SigBP provides a natural umbrella to share practices, research and results among people working in this field.

It would give us an academic context for publishing work on broadening participation in computing -- I'm eager to see it happen! Provide a forum for scholars and practitioners, host a journal (I hope) and bring together people who are promoting different sorts of diversity in computing.

## 6. SIGBP Leadership

The following people have agreed to serve on the SIGBP organizing people if the SIGBP is provided provisional status. With the exception of Brian Blake, each of the following SIGBP Leadership Team members was an active member of the Formation Committee. This group collectively represents a wide range of broadening participation organizations including CDC, STARS, A4RC, ARTSI, NCWIT, ABI, CAHSI, and AccessComputing.

**Teresa Dahlberg**, UNC Charlotte, and STARS Alliance PI

**Monica Anderson**, University of Alabama, ARTSI

**Maureen Biggers**, Indiana University, A4RC PI, and NCWIT Academic Alliance Co-Chair

**Brian Blake**, Notre Dame, and Chair, Coalition to Diversify Computing

**Ann Condon**, University of British Columbia

**Juan Gilbert**, Clemson, EL Alliance, AARCS, and A4RC PI

**Richard Ladner**, University of Washington and AccessComputing PI

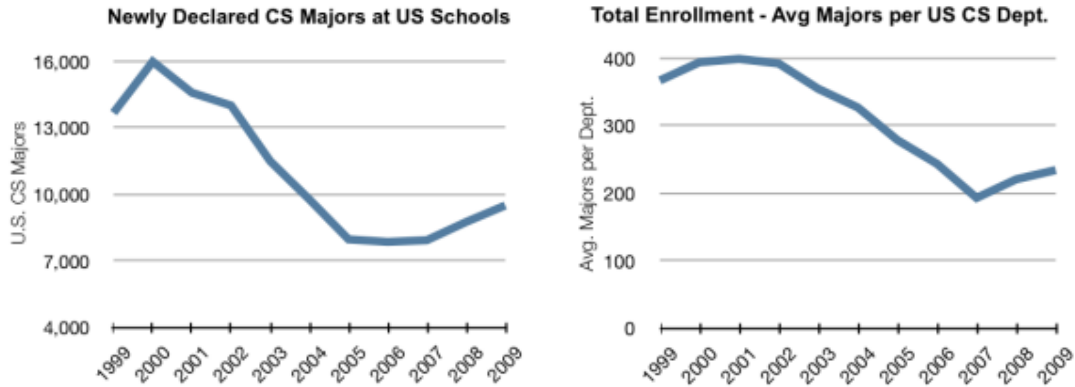
**Bobby Schnabel**, Dean Indiana University, NCWIT Leadership Team, A4RC

**George K. Thiruvathukal**, Loyola University Chicago, STARS

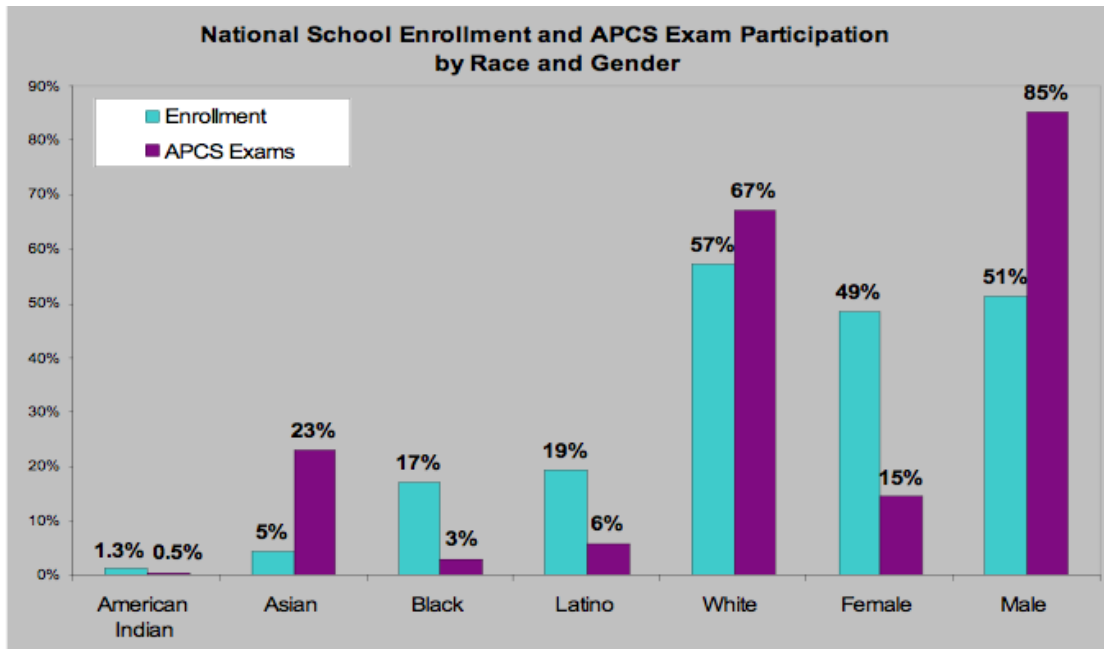
**Manuel Perez Quinones**, Virginia Tech, CAHSI, CDC

Of those 300+ people who electronically endorsed the formation of this SIGBP, seventy-five of them also indicated interest in serving on the organizing committee at some point in time. The names of these 75 people are listed in Appendix D. (The complete list of 309 names will be provided upon request.)

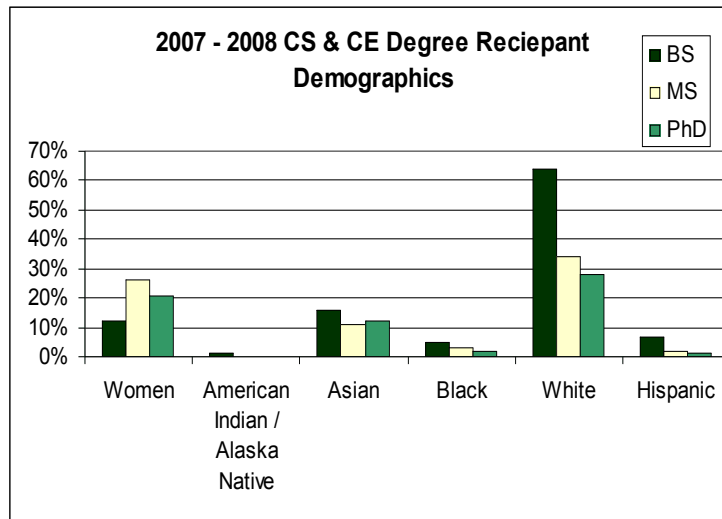
## Appendix A Figures



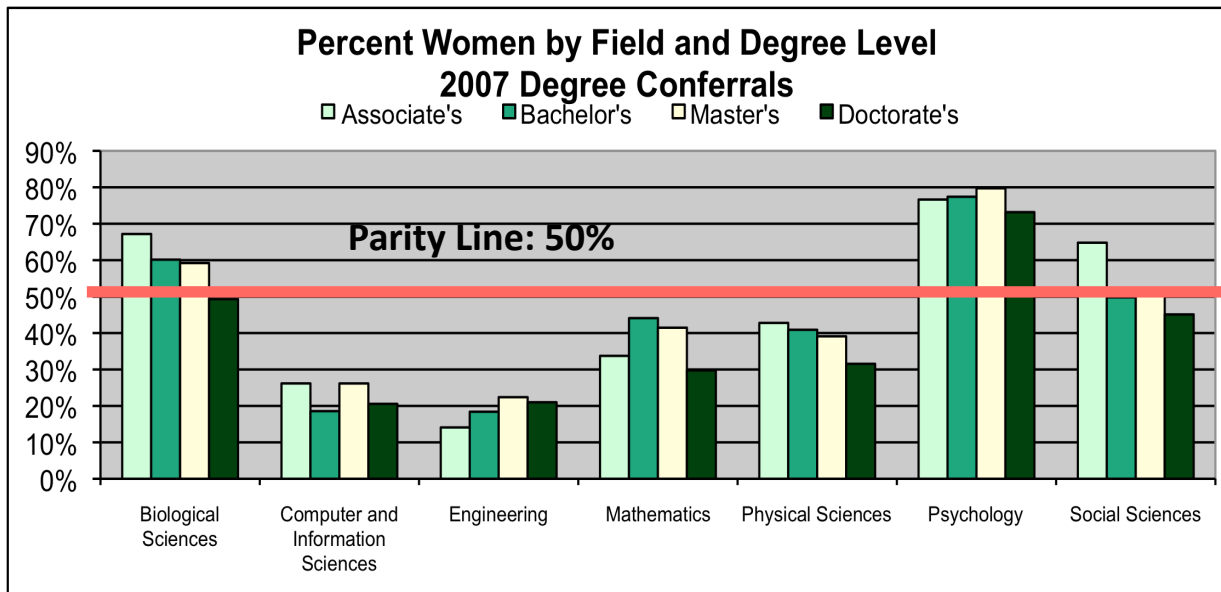
**Figure 1. From CRA Taulbee Report: CS Enrollments, New Majors Up For Second Straight Year**  
<http://www.cra.org/govaffairs/blog/2010/03/cra-aulbee-report-cs-enrollments-new-majors-up-for-2nd-straight-year/>



**Figure 2. From Computer Science Research Association (CSTA) College Board Data**  
<http://csta.acm.org/>

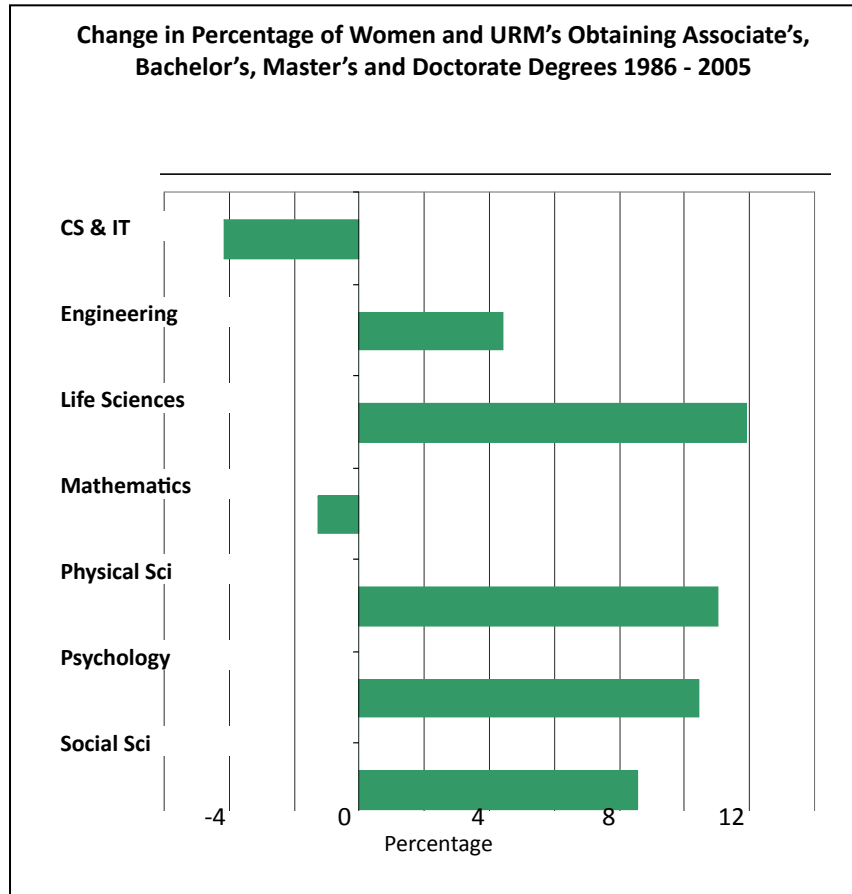


**Figure 3. From the Computing Research Association (CRA) Taulbee Survey, 2007-2008**  
<http://cra.org/>



**Figure 4. From the Commission on Professionals in Science and Technology**  
<http://www.cpst.org/>





**Figure 5. From the National Center for Education Statistics, Digest of Education Statistics**  
<http://nces.ed.gov/Programs/digest/>

Additional data and graphs are found here: <http://logos.cs.uic.edu/recruit/CSStatistics.htm>

## Appendix B Tables

**Table 1: Example Professional Groups for Women and Minorities**

Association of Computing Machinery Women (ACM-W)	<a href="http://women.acm.org">http://women.acm.org</a>
African-American Women in Technology	<a href="http://www.aawit.net">http://www.aawit.net</a>
American Indian Higher Education Consortium	<a href="http://www.aihec.org">http://www.aihec.org</a>
American Indian Science and Engineering Society	<a href="http://www.aises.org">http://www.aises.org</a>
Association of Computer and Information Science Engineering Departments at Minority Institutions (ADMI)	<a href="http://admiusa.org/">http://admiusa.org/</a>
Black Data Processors Association	<a href="http://www.bdpa.org/">http://www.bdpa.org/</a>
British Computer Society Women (BSCWomen)	<a href="http://www.bcs.org/server.php?show=nav.8630">http://www.bcs.org/server.php?show=nav.8630</a>
Computing Research Association Women (CRA-W) in U.S. and Canada	<a href="http://www.cra-w.org/">http://www.cra-w.org/</a> <a href="http://cra-w.org/cdmp.html">http://cra-w.org/cdmp.html</a>
Information Technology Senior Management Forum	<a href="http://www.itsmfonline.org/">http://www.itsmfonline.org/</a>
Latinas in Computing	<a href="http://anitaborg.org/initiatives/systems/lic/">http://anitaborg.org/initiatives/systems/lic/</a> <a href="http://latinasincomputing.wikispaces.com/">http://latinasincomputing.wikispaces.com/</a>
National Action Council for Minorities in Engineering (NACME)	<a href="http://nacme.org/">http://nacme.org/</a>
National Sciences and Engineering Research Council of Canada (NSERC)	<a href="http://www.nserc-crsng.gc.ca/">http://www.nserc-crsng.gc.ca/</a>
National Society of Black Engineers	<a href="http://national.nsbe.org/">http://national.nsbe.org/</a>
Society Advancing Hispanics/Chicanos & Native Americans in Science	<a href="http://sacnas.org">http://sacnas.org</a>
Society of Hispanic Professional Engineers	<a href="http://oneshpe.shpe.org/wps/portal/national">http://oneshpe.shpe.org/wps/portal/national</a>
Society of Women Engineers	<a href="http://societyofwomenengineers.swe.org/">http://societyofwomenengineers.swe.org/</a>
Systems	<a href="http://anitaborg.org/initiatives/systems/">http://anitaborg.org/initiatives/systems/</a>
Women in Technology International	<a href="http://www.witi.com/">http://www.witi.com/</a>
Women in Technology, UK	<a href="http://www.womenintechnology.co.uk/">http://www.womenintechnology.co.uk/</a>
Women of Color in Technology	<a href="http://www.womenofcolor.net/">http://www.womenofcolor.net/</a>
Women's Business Enterprise Nat'l Council	<a href="http://www.wbenc.org/">http://www.wbenc.org/</a>

**Table 2: Example National Communities, Coalitions, Nonprofits, and Initiatives**

Anita Borg Institute for Women and Technology - nonprofit	<a href="http://anitaborg.org/">http://anitaborg.org/</a>
Center for Minorities and People with Disabilities in Information Technology (CMD-IT)	<a href="http://www.cmd-it.org/">http://www.cmd-it.org/</a>
Coalition to Diversify Computing (CDC)	<a href="http://www.cdc-computing.org/">http://www.cdc-computing.org/</a>
Computer Science Teachers Association (CSTA)	<a href="http://csta.acm.org/">http://csta.acm.org/</a>
dot diva	<a href="http://www.dotdiva.org/">http://www.dotdiva.org/</a>
Grace Hopper Celebration of Women and Computing	<a href="http://gracehopper.org">http://gracehopper.org</a>
Great Minds in STEM (formerly HENAAC) - nonprofit	<a href="http://www.greatmindsinstem.org/">http://www.greatmindsinstem.org/</a>
INROADS	<a href="http://www.inroads.org/">http://www.inroads.org/</a>
MentorNet – e-Mentoring for diversity in engineering and science	<a href="http://mentornet.net/">http://mentornet.net/</a>
National Action Council for Minorities in Engineering (NACME)	<a href="http://www.nacme.org/">http://www.nacme.org/</a>
National Consortium for Graduate Degrees for Minorities in Engineering and Science (GEM)	<a href="http://www.gemfellowship.org/">http://www.gemfellowship.org/</a>
National Girls Collaborative Project – Advancing the Agenda in Gender Equity for STEM - nonprofit	<a href="http://www.ngcproject.org/">http://www.ngcproject.org/</a>
National Lab Network	<a href="http://www.nationallabnetwork.org/">http://www.nationallabnetwork.org/</a>
NSF Broader Impacts for Research and Discovery Summit (BIRDS)	<a href="http://www.nsfbirds.org">www.nsfbirds.org</a>
Richard Tapia Celebration of Diversity and Computing	<a href="http://tapiaconference.org">http://tapiaconference.org</a>
STARS Celebration Student Leadership Conference	<a href="http://www.starsalliance.org/starscelebration">www.starsalliance.org/starscelebration</a>
Supercomputing Conference Broader Engagement Program	<a href="http://sc10.supercomputing.org/">http://sc10.supercomputing.org/</a>
Technology Student Association – for middle and high school students	<a href="http://www.tsaweb.org/">http://www.tsaweb.org/</a>

**Table 3: The National Science Foundation BPC Alliance**

Access Computing – for persons with disabilities	<a href="http://www.washington.edu/accesscomputing">www.washington.edu/accesscomputing</a>
Advancing Robotics Technology for Societal Impact (ARTSI)	<a href="http://www.artsialliance.org">www.artsialliance.org</a>
Alliance for the Advancement of African-American Researchers in Computing (A4RC)	<a href="http://www.a4rc.org">www.a4rc.org</a>
Caribbean computing Center for Excellence (CCCE)	<a href="http://ccce.suagm.edu/">http://ccce.suagm.edu/</a>
Commonwealth Alliance for Information Technology Education (CAITE)	<a href="http://caite.cs.umass.edu">http://caite.cs.umass.edu</a>
Computing Alliance for Hispanic Serving Institutions (CAHSI)	<a href="http://cahsi.fiu.edu">http://cahsi.fiu.edu</a>
Empowering Leadership Alliance (EL Alliance)	<a href="http://empoweringleadership.org">http://empoweringleadership.org</a>
Georgia Computes!	<a href="http://www.georgiacomputes.org">www.georgiacomputes.org</a>
Grace Hopper Regional Consortium	<a href="http://anitaborg.org/initiatives/grace-hopper-regional-consortium/">http://anitaborg.org/initiatives/grace-hopper-regional-consortium/</a>
Into the Loop	<a href="http://intotheloop.gseis.ucla.edu">http://intotheloop.gseis.ucla.edu</a>
National Center for Women and Information Technology (NCWIT) – nonprofit	<a href="http://www.ncwit.org">http://www.ncwit.org</a>
Students & Technology in Academia, Research and Service (STARS) Alliance	<a href="http://www.starsalliance.org">www.starsalliance.org</a>
Widening the Research Pipeline (CRA and CDC)	<a href="http://www.cdc-computing.org">www.cdc-computing.org</a>

**Table 4: Examples of Publications that Inform BPC Research**

ACM Proceedings of the ACM Technical Symposium on computer Science Education (SIGCSE)
ACM Proceedings of the International innovations and Technology in Computer Science Education conference (ITICSE)
ACM Transactions on Computing Education
American Behavioral Scientist
American Educational Research Journal
American Journal of Community Psychology
American Sociological Review
Annual Review of Psychology
Computers & Education
Computer Science Education
Contemporary Sociology
Education Policy Analysis Archives
Educational Studies in Mathematics
IEEE Proceedings of the Frontiers in Education Conference
IEEE Transactions on Engineering Education
Industrial and Labor Relations Review
Journal of Black Psychology
Journal of Computing in Small Colleges
Journal of Computing Sciences in Colleges
Journal of Educational Computing Research
Journal of Engineering Education
Journal of Health and Social Behaviors
Journal of Higher Education
Journal of Language and Communication
Journal of Negro Education
Journal of Personality and Social Psychology
Journal of Research in Science Teaching
Journal of Women and Minorities in Science and Engineering
Learning Communities Journal
Organizational Behavior and Human Decision Processes
School Science and Mathematics
Sex Roles: A Journal of Research

## **Appendix C Endorsement Letters**

Letters of support for the ACM SIGBP are included from the following individuals.

1. Renee McCauley, ACM SIGCSE Chair 2010-2013
2. Mark Guzdial, former AMC SIGCSE Chair, Georgia Computes! Principal Investigator (PI)
3. Mark Stockman, ACM SIGITE Chair
4. Richard Ladner, former ACM SIGACT chair; Editor for ACM TOCE Special Issue on Broadening Participation; and AccessComputing PI
5. Brian Blake, Chair, Coalition to Diversify Computing (CDC)
6. Carla Brodley and Kathleen Fisher, CRA-W Co-Chairs
7. Anne Condon, University of British Columbia, and Julita Vasseliva, Cameco NSERC Chair for Women and Science and Engineering
8. Teresa Dahlberg, STARS Alliance PI
9. Chutima Boonthum-Denecke, David Touretzky, Elva Jones, Monica Anderson, and Clement Allen, ARTSI Executive Committee and PIs
10. W. Richards Adrion, CAITE PI
11. Richard Tapia, EL Alliance PI and namesake of the Richard Tapia Celebration of Diversity and Computing Conference
12. Gloria Townsend, Grace Hopper Regional Consortium PI
13. Lucinda Sanders, CEO and co-founder of NCWIT
14. Telle Whitney, President and CEO Anita Borg Institute for Women and Technology
15. Amy Sharma, former AAAS Fellow assigned to NSF BPC program
16. Maureen Biggers, A4RC program manager, NCWIT Leadership Team,...
17. Juan Gilbert, several BPC organizations
18. Jane Margolis, Into the Loop Alliance PI, author of BPC books (Unlocking the Clubhouse and Stuck in the Shallow End)

A copy of the ACM SIGBP Proposal with all 18 letters included in Appendix C can be found here: [www.cs.uncc.edu/~tdahlber/SIGBP.pdf](http://www.cs.uncc.edu/~tdahlber/SIGBP.pdf)

**Appendix D**  
**75 of the 300+ petition signers**

As of August 22, 2011, 309 people signed the online petition indicating 1) I support formation of SIGBP, 2) the SIGBP would support my work, and 3) I would join the SIGBP.

This Table lists the 75 of these people who further indicated that they may volunteer to serve on the SIGBP organizing committee

Adrion	Rick	adrion@cs.umass.edu
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