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ACM SIGCAS COMPUTERS and SOCIETY

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Association for Computing Machinery

Advancing Computing as a Science & Profession

WHO ARE WE?

SIGCAS Computers and Society is the ACM Special Interest Group that addresses the social and ethical consequences of widespread computer usage.

SIGCAS' main goals are to raise awareness about the impact that technology has on society, and to support and advance the efforts of those who are involved in this important work.

Our members are computer professionals from both industry and academia, as well as ethicists, psychologists, sociologists and others. We welcome students from a variety of disciplines. Our areas of involvement include computer ethics, universal access to computer technology, security, privacy, and reliability. We collaborate with other ACM bodies that are engaged in related work, such as COPE, USACM, SIGITE and SIGCSE.

The ACM Computers & Society is an online publication accessible via the ACM Digital Library. The newsletter aims to be an effective communication vehicle between the members of the group.

Participation. Readers and writers are invited to join and participate actively in this Special Interest Group.

Membership is open to all, for US$25 per year, and to students for US$10 per year. The link to join up can be found on our web site, at http://www.sigcas.org

Contribute. The editor invites contributions of all types of written material (such as articles, working papers, news, interviews, reports, book reviews, bibliographies of relevant literature and letters) on all aspects of computing that have a bearing on society and culture.

Please note that it is NOT a peer-reviewed publication. Submissions are checked for relevance, accessibility and basic suitability by the editors but not fully peer reviewed.

For the latest Call(s) for Papers, or instructions regarding formatting guidelines and copyright policy please see the website: http://www.sigcas.org/. Submissions may be sent to editors_sigcas@acm.org.

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Richard Blumenthal Editor-in-chief

SIGCAS EXECUTIVE

Karla Carter SIGCAS Chair.

I come to you as a mixture of practitioner and academic. I'm an academic in the teaching sense. I'm an Associate Professor at Bellevue University, in Bellevue, Nebraska (not the Washington State one and not the New York City hospital one). I'm a bit of an odd duck in the world of CS/IT higher education as my undergraduate degree is in psychology and my graduate degree is in history. Though, I hold a M.S. in Cybersecurity. I have been working in the real-world of IT since 1991 and I still do consulting. Since 2006, I've been teaching IT at both the undergraduate and graduate level.

Samuel A. Rebelsky Vice Chair.

Samuel A. Rebelsky is a Professor of Computer Science at Grinnell College. His responsibilities include assisting the Chair in leading and managing SIGCAS.

Robert Beck Member-at-large.

Robert Beck serves as member-at-large of the SIGCAS Executive Committee. His responsibilities include managing SIGCAS's collaboration with a variety of conferences that address areas of impact of computing on society and the ethics of computing solutions to society's problems. In addition, he helps the SIG continue to serve as a significant organization working on computing and social responsibility, computing ethics, and the broader impacts of computing as it invades every corner of our lives.

Mikey Goldweber Past Chair.

As immediate past chair, I get to enjoy a reduced role on the SIGCAS Executive Board. My primary responsibilities focus on SIGCAS's new conference (COMPASS: https://acmcompass.org/) and workshop (LIMITS: http://computingwithinlimits.org/2018/), in addition to helping out with our list of "in cooperation" conferences and workshops. My personal focus is continuing to be an evangelist for "Computing for Social Good in Education" (CSG-Ed). CSG-Ed is an umbrella term meant to incorporate any educational activity, from small to large, that endeavors to convey and reinforce computing's social relevance and potential for positive societal impact. When one considers what student's life aspirations are and compare them with how we involved with CS education present the discipline, one observes a mismatch. The CSG-Ed movement seeks to address this mismatch since computing, as with all disciplines, should be have some focus on the positive role that discipline can play in our world. Any reader interested in learning more about the CSG-Ed movement should contact me via email: mikeyg@xavier.edu

Richard Blumenthal Editor-in-Chief.

My chief responsibilities include managing and overeesing the content produced for the online publication *Computers and Society*. I am a Professor and Chair of the Computer Science Department at Regis University, in Denver Colorado. Part of my responsibilities at Regis include supporting the "Center for Common Good Computing". Recently, I've taken an active role in promoting and supporting "Computing for Social Good in Education", as described by Mikey (above).

CIGCAS

MEMBERSHIP BENEFITS

Subscription to the online magazine ACM Computers and Society, which is published three times a year.

Members have access to the full archive of the online publication and its printed predecessor in the ACM DL. Please see www.sigcas.org.

Discounted registration fee for SIGCAS sponsored conferences and workshops. “In cooperation” sponsor of several ACM and non-ACM conferences related to SIGCAS’ interests, including LIMITS.

SIGCAS presents two awards each year: The Making a Difference Award and the SIGCAS Outstanding Service award.

SIGCAS-ANNOUNCE mailing list: includes regular announcements of upcoming conferences and calls for participation.

SIGCAS-Talk mailing list to enable member-member interactions and the committee will seek to stimulate discussion on this list amongst members. Subscription to the list is restricted to SIGCAS members and is optional for them.

NEWS

UPCOMING CONFERENCES

2020

Computing for the Social Good in Education (CSG-ED): SIGCSE ’20 Pre-Symposium

March 11, 2020 — Portland, Oregon USA

This symposium provides an opportunity for learning technical and professional skills, while reinforcing computing’s social relevance. The morning is on Humanitarian Free and Open Source Software (HFOSS) and the afternoon on techniques for incorporating CSG-Ed projects into the computing curricula.

International Conference on Smart Cities and Green ICT Systems (SMARTGREENS)

May 2-4, 2020 — Prague, Czech Republic

The purpose of the 9th International Conference on Smart Cities and Green ICT Systems (SMARTGREENS) is to bring together researchers, designers, developers and practitioners interested in the advances and applications in the field of Smart Cities, Green Information and Communication Technologies, Sustainability, Energy Aware Systems and Technologies.

Sixth Workshop on Computing within Limits (LIMITS 2020)

During ICT4s: June 21-27, 2020 — Bristol, United Kingdom

The LIMITS workshop aims to foster discussion on the impact of present and future ecological, material, energetic, and societal limits on computing. These topics are seldom discussed in contemporary computing research. A key aim of the workshop is to promote innovative, concrete research, potentially of an interdisciplinary nature, that focuses on technologies, critiques, techniques, and contexts for computing within fundamental economic and ecological limits.

LETTER

FROM THE EDITOR

BY RICHARD BLUMENTHAL

Photo: © Richard Blumenthal

Welcome to another issue of ACM *Computers and Society*. With the publication of this issue, we have finally cleared the backlog of previous submissions awaiting publication.

In this issue, our Contributing Columnist Doug Schuler, the SIGCAS Historian, continues his examination of the role our SIG in history and asks the question "*What would we like to be remember by?*". He examines and offers some suggestions as to how we might begin to organize or mobilize to better address the mission of the SIG. If you're like me, after finishing his article, you'll be "chomping at the bit" to get started.

Also in this issue, our Contributing Columnist, Michelle Trim reflects on her experience of teaching multiple sections of a graduate course that initiated with asking "What makes a good Computer Scientist?". As I want you to read her contribution, I don't want this teaser to be a spoiler, but I found the revelation and examination of the zero-sum "make money or do good" to be quite interesting.

Mikey Goldweber's Reflections from a Past Chair piece reflects on his recent sabbatical conversations with colleagues examining questions, such as, "*What should everyone know or have experienced about computing?*" and "*Where should digital citizenship fit in?*".

In this issue, Oliver Bates provides a summary of the LIMITS 2019 workshop which centers on issues related to computing within fundamental economic and ecological limits.

Part of clearing the backlog of previous submissions awaiting publication are the six abstracts from last year's mini-symposium on Computing for the Social Good in Education (CSG-Ed) included in this issue. The CSG-Ed mini-symposium was held as a pre-symposium event at SIGCSE'19 in Minneapolis. As an attendee, I had the pleasure of interacting with each of the authors to learn of their contributions towards promoting Social Good in Computer Science, as well as, participating in activities focused on continuing to grow the CSG-Ed movement. These abstracts and the recent *ACM InRoads* article Computing for the Social Good in Education should give you a good feel for some of the exciting working being done in this area. Speaking of CSG-Ed...

Perhaps you're already a CSG-Ed practitioner and didn't realize there's a SIGCAS community for like-minded educators or would like to find out more about this movement. If so, mark your calendars for the upcoming 2nd *Annual Computing for Social Good in Computer Science Education* Pre-Symposium and *A Hands-On Tutorial on How to Incorporate Computing for Social Good in the Introductory Course Sequence* Special Session events at SIGCSE '20 in Portland, Oregon.

My Parting Shot Op-Ed, *When E-Voting, Trust Computer Scientists: Not Computers*, is inspired by the recent E-Voting issue that resulted from the "failure" of an app used to collect and report results in the Iowa caucus, which is part of the nomination process for the next U.S. President. If you're not aware, ACM has a policy on E-Voting and our members continue to comment on the role E-Voting should play in society and its current ability to do so appropriately.

I would encourage our members to recommend ACM *Computers and Society* as a publishing opportunity that includes student publications.

LETTER

FROM THE CHAIR

BY KARLA CARTER

Photo: Faye Cornish @ https://unsplash.com/photos/ibqxDGKqlWI

Hello, SIGCAS members! Greetings from your Chair!

The Markkula Center for Applied Ethics at Santa Clara University recently re-posted their classic 2017 article on ten areas of interest for artificial intelligence and ethics (https://www.scu.edu/ethics/all-about-ethics/artificial-intelligence-and-ethics/), including concerns such as safety, transparency, employment disruption, Skynet, and bias, giving a nod to the promise of good, but also exploring less considered realms such as losing the ability to make decisions, a lack of purpose in life, and the overall effect of AI on the human spirit, asking "What will happen to the human spirit if or when we are bested by our own creations in everything that we do? Will human life lose meaning? Will we come to a new discovery of our identity beyond our intelligence?" What does it mean to be human? And what if AI becomes self-conscious? What sorts of rights should it have?

Perhaps the sort of AI that raises these concerns is further away than reality would suggest (I'm still waiting for a Roomba that loads and unloads the dishwasher and cleans the bathrooms!), but the time to consider these issues is now, before they become imminent. Bias and transparency of algorithms are already pressing concerns. Safety and employment disruption make the news, as well. Nicholas Carr's 2013 Atlantic article "All Can Be Lost: The Risk of Putting Our Knowledge in the Hands of Machines" details what happens when pilots forget how to fly planes. In 1930 John Maynard Keynes predicted that technology advances would lead to a 15-hour work week and he worried how people might use the extra time they gained in a fulfilling manner: "Yet there is no country and no people, I think, who can look forward to the age of leisure and of abundance without a dread. For we have been trained too long to strive and not to enjoy."

I joke that I'm terrible at small talk - and I can say from experience that "so, what kind of funeral do you want to have?" can be taken badly as an opening line - but these issues don't go away just because we don't talk about them with friends and family and acquaintances and anyone else we interact with. Our SIG can lead the way on pondering these matters related to not only the AI incarnation of technology, but all technology.

Come find me on Twitter, @acmsigcas.

LETTER

REFLECTIONS FROM A PAST CHAIR

BY MIKEY GOLDWEBER

Photo: Kevin Noble @ https://unsplash.com/

One of the great perks of being an academic are sabbaticals. I've been known to joke with my students that there are four excellent reasons for life as an academic: May, June, July, and sabbaticals. Funny, I almost never get asked what are the four top reasons to avoid the academic life: grading, grading, grading, and obtuse administrators (who funnily enough used to be professors themselves ... go figure).

I am currently spending six months on sabbatical in Bologna, Italy. For those not in the know, people from all over the world travel to Italy for Italian food/wine, Italians travel to Bologna for the same. Bologna, in addition to being a charming medieval town, is known by three nicknames: La Dotta, La Grassa, La Rossa. La Dotta - the learned one. Bologna is home to the mother ship of Universities: The University of Bologna, aka the Alma Mater Studiorum (the nourishing mother of studies). Unibo, as its affectionately called, founded in 1088 is the oldest existing university in continuous operation. Sorry Oxford, Unibo has you beat by at least 8 years. La Grassa - the fat one. Bologna, and the surrounding region is responsible for much of the Italian food cannon: tagliatelle, tortellini, tortelloni, ragu (aka Bolognese sauce), parmesan, mortadella, balsamic vinegar, etc. La Rossa - the red. Debate rages whether the red is for the typical red terracotta roof tiling, the red of Ducati motorcycles and Ferrari racing cars, or the far left-leaning, communist(?) government/local politics.

While I am here to work on a pedagogy-based operating systems project, discussions with my Unibo colleagues range far and wide. My primary colleague, Renzo Davoli, is also involved with the effort to update the national computing curricula. This work encompasses primary education through the various secondary school options. Some upper secondary school options are for the university bound, while others are not. Furthermore, both the university bound and non-university bound upper secondary schools come in a variety of flavors. Italians love complexity, especially when it comes to bureaucracy.

It turns out that thinking about what and how to study computing from early elementary through secondary school is a world-wide phenomenon. Some of the questions we've discussed include:

- What should everyone know or have experienced about computing? Does this include some form of programming? An understanding of the limits of computing? If the Pythagorean Theorem is part of how a mathematician would answer this question, then what is one of computing's Pythagorean Theorems? Where should digital citizenship fit in, if at all? Since how we interact with others in the physical public sphere is not owned by any one discipline, why should how we interact in the virtual public sphere be the responsibility (and part of the curricula) of computing educators - or should it?
- What additional experiences should University-bound students have? Should their experiences or learning outcomes be different for STEM bound students?

I am pleased to observe that these discussions no longer center around application proficiency, i.e. MS Office Productivity tools. The counter point to this is my recollection that I learned both to type and drive a car via electives offered by my public school. Furthermore, those working on these curricula are not solely focused on economics - the education of a workforce armed with the appropriate skill sets of the day. Like the discussion of the Pythagorean Theorem, people are wrestling with what belongs in the canon.

I invite you, the reader, to reflect on this and try to summarize what you conjecture everyone should know about computing. Maybe it is easier to contemplate the contrapositive: What should an educated person be embarrassed not to know about computing? Feel free to continue the discussion via the SIGCAS email discussion list (SIGCAS-TALK@listserv.acm.org).

BY
OLIVER BATES

The LIMITS workshop (http://computingwithinlimits.org/2019/) aims to foster discussion on the impact of present and future ecological, material, energetic, and societal limits on computing. These topics are seldom discussed in contemporary computing research. A key aim of the workshop is to promote innovative, concrete research, potentially of an interdisciplinary nature, that focuses on technologies, critiques, techniques, and contexts for computing within fundamental economic and ecological limits. A longer-term goal is to build a community around relevant topics and research. We hope to impact society through the design and development of computing systems in the abundant present for use in a future of limits.

Following on from the success of our in-coop with ACM SIGCAS in 2018, we have continued our relationship in 2019. LIMITS 2019 was co-chaired by Oliver Bates (Lancaster University) and Jay Chen (NYU Abu Dhabi).

As part of the communities attempt to walk-the-talk in terms of environmental sustainability this year we colocated the workshop with ICT4S in Lappeenranta, Finland, with an aim to reduce unnecessary travel for the community as there is overlap with the ICT4S community. To help include those outside of Europe we championed remote participation, including an open access stream of all keynotes and presentations and a buddy system for participation in breakout sessions. All sessions were recorded and will be made available on the LIMITS 2019 website.

David Abson (Leuphana University, Germany) kicked off the workshop with a keynote on his work in the transdisciplinary project, Leverage Points for Sustainability transformation, focusing on conceptualizing sustainability interventions and transformative change in complex socio-ecological systems from a systems thinking perspective.

The workshop featured 8 full papers (https://dl.acm.org/citation.cfm?id=3338103&picked=prox) and 3 short papers across the two days, covering a broad range of topics relating to computing and social, environmental, economic and political limits. The range of topics included: conservation technology and governance; the political economy; community agriculture and permaculture; civic participation and e-government; the evolution of complex systems and institutions; surveillance capitalism; sustainable design; displaced populations; energy and the internet; labour and the gig economy; and art, outreach and transitional imaginaries in the Anthropocene.

In 2020 LIMITS aims to go further with more sustainable hosting of a workshop/conference and will be distributed between University of Bristol, Bristol, UK (collocated with ICT4S 2020) and University of Southern California, Los Angeles, USA, continuing remote participation with main sessions overlapping 8am-11am (Pacific Daylight Time)

And 4pm-7pm (British Summer Time). LIMITS 2020 takes place on June 21/22 and will be co-chaired by Barath Raghavan (USC) and Oliver Bates (Lancaster University). In 2020 the workshop is also updating its model to include invited papers and presentations to be inclusive of a broader set of perspectives and values. We welcome SIGCAS to put forward any recommendations.

For updates on the community please join our google group: https://groups.google.com/forum/#!forum/limits (please email Oliver Bates for access o.bates@lancaster.ac.uk).

COLUMN

HOW MIGHT SIGCAS MAKE HISTORY IN THE NEXT ERA?

BY
DOUGLAS SCHULER

Keywords: Social Responsibility, Pattern Languages for Social Change
Categories: Social and professional topics → Professional Topics → History of Computing

The title of this column comes from the parting provocation in my column in the previous SIGCAS Newsletter (48: 3-4). Besides reducing the burden of coming up with a new title it actually does describe this essay reasonably well. Fancy that!

The suggestion is that we can use the frame of making history to consider possible future directions that the SIGCAS community could pursue. It suggests more than a thought experiment because we could easily act upon our findings. It could go a little like this: Rather than just do the things that we were going to do anyway and then have the historians come along after the fact and determine whether what we did was historic or not, we could take some time and consider how we might go about doing things that could be considered historic in terms of our mission and aspirations.

Something is generally historic when it reflects or signals something significant in an era and becomes a part of our remembered past. Sometimes a historian makes that call after the fact but it's generally the job of non-historians to actually perform the events that we ultimately call historic. Thus making history is a social activity that potentially anybody can do.

SIGCAS members are interested in how computing applications, opportunities, challenges, narratives, and ideologies play roles in human lives. As such SIGCAS has more license to explore thorny issues that are conceptually further away from the "machinery" that is always present in ACM's name, the ones that can't be "solved" algorithmically. In the column I keep drawing on, I pointed out that "SIGCAS was born amidst controversy" and that "the work of the SIG, if done correctly, will undoubtedly invite controversy."

What would we like to be remembered by? What might we do that was considered significant in the development, use, or regulation of computer technology?

History of course is created from moment to moment. Events feed upon each other, ideas are formulated, decisions both trivial and momentous are made, chance occurrences become significant — or not. Microhistory accretes and becomes macrohistory — or just history. "History" is not a singular definite objective thing, it's malleable and is subject to change.

Our mission states that SIGCAS is to "provide a forum to discuss, debate and research all issues pertaining to the social implications of computing, including ethical and philosophical concerns, for the computing profession." How might SIGCAS organize or mobilize itself to better address this aim? Certainly the forum that we do have could be improved. (Nothing is perfect!) What might a SIGCAS forum (or forums) look like? Certainly our email distribution list could be a part of this but other Online or in-person venues could also be used. And because SIGCAS "addresses the social and ethical consequences of widespread computer usage" we could also choose to be actively involved writing projects, public events, or, even, technology development.

One of SIGCAS's aims from the late 60's was developing an Online resource guide. Is this something we would want to undertake now? And, if so, what would it look like? Lately while attempting to wrest order from chaos in the storage area in our basement (which is now in its 32nd consecutive year serving as a receptacle for all manners of things we thought perhaps we might need again) I ran across an article by Langdon Winner, a longtime philosopher of technology and the author of The Whale and the Reactor and other books, called "How to be a Technology Critic." Along similar lines, our hypothetical guide might include is How to do Computers and Society work (or How to be a Computer and Society History Maker?).

Our enrollment in SIGCAS provides some benefit to us individually but as a group or community the potential for more benefit is there. We can undoubtedly create more value working collaboratively than from the 300 or so of us working individually. But how to proceed? I'm proposing a participatory approach to improve our collective intelligence quotient

I can imagine quite a few ways to get started but at the onset it might be useful to just gather our thoughts on what areas of computers and society are most interesting to us individually. (It would be interesting to know—but harder to learn—what societal issues the rest of the ACM found important. Also, of course, the issues faced by citizens at large keep them up at night? As an activist for the now defunct Computer Professionals for Social Responsibility (CPSR) I especially appreciated the fact that our organization could adapt to changing times by adding new issue areas based on interests of our members and the dependence on and understanding of computers. As you may know, CPSR's website, for as long as somebody pays the bills on the domain, is still available. On the website the list of the issue areas (below) that existed at the end of CPSR's tenure can still be found. These interests were described under the broad areas of Civil Society and the Internet, The Computer Profession, Freedom of Speech, Internet Governance, Access to the Internet, Privacy, and Intellectual Property.

Broadband
Community Networks
Computer Work and the Workplace
Computers and the Environment
Directions and Implications of Advanced Computing Symposium
Free/Libre Software
Global Information Society
Intellectual Property
Internet Governance
Participatory Design
Privacy and Civil Liberties
Technology and Ethics
Voting Technology
Weapons and Peace
Women in Computing

Perhaps this list or one like it might be used to reflect on what our interests look like when considered holistically After identifying mutual concerns or interests we would be in a better position to gauge what, if anything, we could or would do with this information. It might be possible for the whole group to embrace a big research or other type of project, several smaller ones, or none at al.

I'd like to do is help facilitate a sort of "smart market" experiment in cultivating our collective intelligence. All of our members have things that they'd

Photo: João Silas @ https://unsplash.com/photos/iI_LgQ8JZFGE

like to offer to the rest of us and things that they'd could use our help with. Connecting these dots—A needs z and offers y; B needs y, and C offers z, for example—could theoretically build interesting and productive information and action networks of varying complexity that wouldn't necessarily have been put together without that information.

By providing some examples of what I mean that are based on my interests, it might also be possible to begin a longer, more enriching process. Somebody has to go first! Very broadly speaking, I am working in two main areas. The first is that I am interested in the broad idea of civic intelligence, which is basically the ability of groups of people to address shared issues effectively and equitably. I'm looking for projects that could use this concept in policy or technology support or anything else. I'm also looking for suggestions and critiques that could help us think about it and make it more useful.

On a more immediately practical side, I am interested in the development of patterns and pattern languages for social change. To this end, I worked with 80 or so authors to develop the Liberating Voices pattern language. These patterns that include The Commons, Meaningful Maps, Indigenous Media, and over 130 others, are available Online (https://www.publicsphere-project.org/patterns/lv) as well as in the book (MIT Press, 2008). They are also used in an Activist Mirror app (https://labs.publicsphereproject.org/am) that is still under development. The app asks users to answer 8 questions in order to provide them with the type of activist they seem to be and to suggest four patterns that seem to be most relevant. The Activist Mirror could be taken a variety of directions if there was interest.

In either area above, I am also happy to offer advice, feedback, etc. to people who want to pursue these areas in any way. For example I have been communicating with a group based in Los Angeles that is working on technology that uses pattern languages for low-income participatory design projects. I've also been working on a pattern language that would help indirectly coordinate Green New Deal projects. An Online pattern sharing approach is also very common topic among pattern language aficionados.

I'm also interested in events. They wouldn't have to be similar to CPSR's Directions and Implications of Advanced Computing Symposia that I organized but there are adoptable ideas to be found there. Incidentally SIGCAS was a co-sponsor for many of these and could be the organizer of the next edition in the series. I see two other possible workshops that SIGCAS could host, Technology for the Common Good or Technology and Wicked Problems, that are extremely relevant in today's world.

There are doubtless other approaches that could help us understand better what collective intelligence (including anxiety and aspirations) we have; we could learn more about ourselves; share project ideas; keep each other better informed with news and studies, and opportunities. We could also build apps or Online resources. What competences do we have, how do we process information, what skills should we develop?

As the current historian of SIGCAS I hope that the thinking, reflections, and experiences thus far can provide grounds for some optimism regarding our precarious future. Like finding Langdon's excellent essay in vast piles of more prosaic items, SIGCAS members may also find it useful to comb through their own mental and physical storage areas for provocations and prompts for future work. It is possible that the roles we play may add up to something, possibly, even, helping to attain some of the ends we hope to see.

Douglas Schuler
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COLUMN

MOVING FROM CONSCIOUSNESS: RAISING TO FOSTER A SOCIAL CONSCIENCE

BY
MICHELLE TRIM

Keywords: Computing, Ethics, Social vs. Financial Gains
Categories: Social and professional topics - Computing / technology policy

This past fall semester, I had the idea to lead a small group of graduate students in offering a First Year seminar for new computer science and informatics majors that focuses on ethics. Feeling clever, I themed our sections: "What makes a 'good' computer scientist?" Together, my students and I taught nine sections under this label. It was a learning experience teaching this one-credit course alongside this brilliant group of MS and PhD students, two of whom had been in my undergrad courses previously. We learned very quickly that right now, in our large public university, in our fairly well-funded state, that our first-year students' primary concern was finding a good job. Many selected our seminar because they thought it was going to be about how to make them the best – how to set themselves up to have the best chance at economic success after college. While we were initially surprised at how these first-year students defined our seminar topic title, it makes sense that they would see being 'good' as being best evidenced by achieving financial success.

Rather than give up, we used our individual strengths to give students something they wanted (lessons in how to use Git, for example) in an implied exchange for their continued participation in our ethical readings and class discussions. Ironically, giving students what they wanted, advice about job searching, assuaged many of their frustrations with our readings on algorithmic bias [8] and the potential dangers to society presented by an improperly trained predictive policing system [9]. Pretty soon it became clear that we had effectively raised students' awareness of the ethical concerns that we had made the focus of the first part of our seminar. Topics of student led presentations demonstrated their attentiveness to our lessons by supplying examples of concerns we hadn't previously presented in class, such as the Apple Credit Card scandal [11] and the environmental impact of cryptocurrency mining [12]. And yet, comments in class discussions described social responsibility as an elective, abstract concept. After all, why do these issues that seem so far away and so much more complex than their first year programming homework have any bearing on them getting good-paying jobs that won't wane with age? What we failed to do was convince students why they should care.

Before we judge these students too harshly for their reluctant journey into the social impacts of computing, it is worth thinking a bit about how wealth inequality has changed in the United States in the last twenty years in order to better understand their anxiety. In 2000, the national minimum wage was $5.15 [5] and average, annual tuition at 4-year public universities in the U.S. was $8635 [4]. In 2015, that number more than doubled to $19204 [4]. In 2015, the federal minimum wage was $7.25 [5]. Across those 15 years, the minimum wage increased by just over 40% while average tuition increased by 122%. Since then, tuition has continued to rise, increasing at a rate of about 2-3% per year on average [10]. The minimum wage has not changed. Think for a second about all of the narratives that this economic reality disrupts. Students cannot save for college by working a summer job or cover tuition by working part time while enrolled. At best, they *might* be able to save enough to cover their first year textbooks. What are the impacts of this new economic reality? One clear result is that students from non-wealthy homes feel enormous pressure to achieve economic stability, likely as a direct result of loans incurred to attend college with 28% of all undergraduates taking federal loans in 2019 [2]. Not all loans waive interest while students are enrolled, and the lending limits of most of the federal loan programs are not adequate to cover all expenses for some students. As a result, 66% of graduates from public institutions begin their professional lives with an average $28550 in student loan debt [1].

I've addressed the financial pressure that might result in a sea of poker faces in an ethics-based first year seminar. But, what explains the continued lack of self-engagement with these topics once we started providing the sorts of help that students seemed to value? While many students accepted quite readily the ethical problems we exposed, many struggled with two big aspects of those realities. One, what do these broad, social implications have to do with them as individuals and two, to what extent do they or will they have any power to do anything about it. More than one student has described themselves as a "cog" during my time teaching computer science majors, and many have expressed fatigue with the idea that they should 'vote with their feet' if they find themselves working for a company engaged in morally objectionable activities. Changing jobs at the drop of a hat requires a level of economic privilege that not everyone has at their disposal. Rather than presenting ethics to CS students in individualized ways, as being about their "character," about their reputation and about their decision making, we can instead present recognizing and responding to the impacts of computing on society as a shared responsibility. Students are smart. They are looking around and noticing what behaviors get rewarded. Morality after all is a social construct, and as such, will be shaped and reinforced by any person's set of influencers. If the problem of unethical technology was really rooted solely in the individual, it would be much easier to combat. Mantras of "move fast and break things" are anthems for the careening, full-speed-ahead approach to technological development that *seems* to be heavily rewarded in the marketplace. And yet, sociology of technology expert Ruja Benjamin asks us why we don't say "Move slower and empower people," instead [3].

My collaborators and I saw our students equate acting ethically with losing financially, explaining to us in various ways that companies are in business to turn a profit or they won't survive. We found that our students were able to engage with us in appreciating the complexity of some of the current computing in society challenges, even expressing a desire to someday be an architect for human-centered computing. And yet, we never seemed to fully move them beyond that same basic dilemma revealed in the early days of our

class: make money or do good. Rather than feel discouraged by the entrenchment of that binary, we should take note that there are signs of a back-lash happening. The biggest tech companies are starting to feel the pinch of an inverse supply vs demand talent ratio where graduates are realizing that they have more power to choose than they thought. For example, in 2019, the rate at which applicants accept Facebook's software engineering job offers has dropped to 50% from the 90% offer acceptance rate enjoyed in 2016 [6]. Using the moniker "Techlash," a recent NY Times article explores this growing discomfort with big tech behavior [7]. In it, a senior at the University of Michigan "'Working at Google or Facebook seemed like the coolest thing ever my freshman year, because you'd get paid a ton of money but it was socially responsible,' … Now, he said, 'there's more hesitation about the moral qualities of these jobs."' A similar quote also appears from a CS M.S. student at Stanford: "'It felt like in my freshman year Google, Palantir and Facebook were these shiny places everyone wanted to be … Now if a classmate tells me they're joining Palantir or Facebook, there's an awkward gap where they feel like they have to justify themselves.'" [7]. More quotes appear in the article from students and graduates from Stanford and Yale, all saying basically the same thing, working for Big Tech =="selling out." The article goes on to describe examples of tech professionals pushing back, something that has been happening across the country with employees using everything from social media hash-tags [16] to letter writing campaigns and petitions [13] [14] [15] to even walk-outs [17]. Perhaps "Move slower and empower people," has more potential for resonance with students of today than we realize.

When we think about what contributes to our own, individual sense of ethics and social responsibility, we don't make those determinations in a vacuum. Likewise, as we engage with, teach, mentor, advise and converse with students we model the values informing our own sense of right and wrong, whether we realize it or not. It isn't irresponsible to encourage students to follow their own sense of right and wrong, to support them in resisting the 'do good or make money' quandary. It doesn't have to be framed as an either or. Students are smart. They will notice when we add more non-profits to our job fairs, when we applaud graduates for their contributions to increasing the common good. All academic programs want high placement numbers in graduate school or industry. We don't have to sacrifice students getting jobs in order to support them in making careful choices about which jobs and which programs they wish to go after. In explicitly valuing our students' values, we demonstrate for them the importance of ethical decision making, and we model for them the idea that being a "good" computer scientist is not defined by money.

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ABSTRACT

HELLO, WORLD: AN INTERNALIZATION AT HOME PROJECT FOR COMPUTING FOR SOCIAL GOOD

BY
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Abstract

We have created a cross-institution activity to explore the outcomes of an Internationalization at Home (IaH) initiative conducted to expose first year computer science students to the concept of computing for social good in an international context. In doing so we explore how differences in culture can influence students' perceptions and approaches to computing for social good.

Keywords: Computing Social Good Education, CSG-Ed, Internationalization at Home
Categories: **Social and professional topics** → Professional Topics → Computing Education

Participants

The initiative included students from MacEwan University located in Edmonton, Alberta, Canada and Tecnológico De Monterrey located in Guadalajara, Jalisco, Mexico. All students were enrolled in an introductory Computer Science course in the Winter term of 2017. Participation was optional, but those who participated were given extra credit as an incentive. Overall, 32 Canadian and 52 Mexican students participated in the first survey, 20 Canadian and 26 Mexican students in the second survey, and 17 Canadian and 18 Mexican students in both the virtual discussions and the third and final survey.

Activities

At the beginning of the term, students from each school were given a presentation introducing them to the concept of technology and computing for social good. Specifically, the presentation involved discussions of how computing can be used to solve issues in various communities. Emphasis was placed on the ability of the creators of such apps to determine a need in their community and create a technological solution to address that need.

Shortly after the presentations were delivered, all students were sent an email officially inviting them to participate in the IaH initiative. The first phase of the initiative began with students having to complete a first survey. In the first survey, students were asked to identify issues in their community and propose two to three applications that could help solve these issues.

Following the completion of the first survey, the responses were analyzed, and a set of *common* applications were determined. In the survey that followed, students were required to choose three of the common applications that they thought were most important. Ie students were then asked to share why they chose the top three applications they did and to explore how they contribute to social good.

Those who participated in the second survey were invited to participate in short video conference discussions. Each discussion involved between one and three students from each school. A facilitator was present in all virtual discussions to facilitate the discussion process. Students took turns discussing their top three apps from the second survey.

A third and final survey was completed where students reflected on their experience in participating in the IaH initiative. Ie participants were asked if they enjoyed the experience, whether they felt the experience was valuable, and how their experience influenced both their ideas about computing for social good and perceptions of Canadian and Mexican culture.

Thematic Analysis

Thematic coding was used to effectively and qualitatively compare the application choices made by each of the students in the first two surveys, *Coding* is a common analysis technique in social science research and involves each survey response being categorized by an objective researcher to one of a set of given categories. Codes were created within the themes of *Type of Application*, *Scope of Application* and *Reaction to the Experience*.

The *Type of Application* theme reflects the type, category, or classification that an application would best be defined as, particularity in the context of an app store. Ie eight application codes are as follows: education, security, networking, jobs, health, productivity, environment, and other.

Most categories are self-explanatory. For example, the theme of *education* refers to any app that relates to education, including but not limited to, learning, educational resources, and cognitive development. *Security* refers to any application relating to security or safety of any group of people. *Networking* means allowing multiple users to interact with one another, allowing them to exchange and gather information from one another, and so on. In the first survey, as shown in Table 1, many suggestions were in coded as networking, education, or productivity across both universities. Ie data also revealed differences. For example, students from the Canadian university did not mention environmental apps as much as the Mexican students.

Table 1: Survey 1 Type of Application Codings

Canadian University		Mexican University	
Type of Application Coding	Percentage of Times Coded	Type of Application Coding	Percentage of Times Coded
Networking	32.8	Networking	26
Education	21.9	Productivity	23.1
Productivity	17.2	Education	19.2
Health	10.9	Health	14.4
Security	9.4	Environment	7.7
Jobs	4.7	Other	5.8
Environment	3.1	Security	2.9
Other	0	Jobs	1.0

In the second survey, where students ranked apps from a curated list, the frequently chosen application types were similar between the two schools (see Table 2). Interestingly, productivity apps dropped significantly in the second survey.

Table 2: Survey 2 Type of Application Codings

Canadian University		Mexican University	
Type of Application Coding	Percentage of Times Coded	Type of Application Coding	Percentage of Times Coded
Education	35.0	Networking	28.2
Networking	21.7	Security	24.4
Security	20.0	Networking	15.4
Jobs	8.3	Health	15.4
Health	8.3	Jobs	9.0
Environment	6.7	Productivity	3.8
Productivity	0	Environment	3.8

The *Scope of Application* theme indicates the potential reach of the apps. The different scope categories used were: local, national or global. The majority of students chose locally-based applications in the first survey. This trend continued in the second survey as well (See Figure 1).

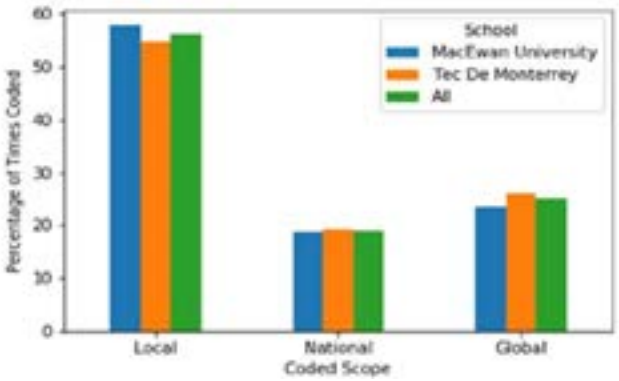

Figure 1: Survey 1 Percentages of Scope Codings by School

The *Reaction to the Experience* indicates whether or not the students were surprised by their perceived similarities or differences in the interaction with the other students via video-conference. As shown in Figure 2, the responses from the third survey indicate that majority of students from both schools were surprised at how similar or dissimilar their responses were compared to the students from the other school.

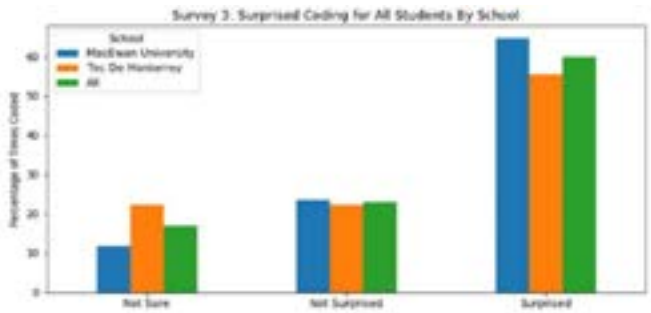

Figure 2: Survey 3 Percentages of Reaction by School

Conclusion

The aim of the study was to explore and identify similarities and differences in the perception of technology as an instrument of social good between students at Canadian and Mexican Universities via an IaH initiative. We found students generally share similar ideas regarding applications for social good. Despite being from different countries and universities the students focused on similar kinds of applications as well as on apps that benefit their local communities rather than apps with a national or global impact. Finally, the participants felt that their personal outcomes of this initiative were surprising and new. We believe this project was beneficial to the students to introduce them to the use of computing for social good and to better understand another culture.

Acknowledgments

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ABSTRACT

INTENTIONALLY EDUCATING FOR THE SOCIAL GOOD IN COMPUTER SCIENCE

BY
RICHARD BLUMENTHAL AND JOHANNA E. BLUMENTHAL

Abstract

As exemplified in the ACM Code of Ethics and Professional Conduct, the ethical responsibility of computing professionals obliges both guiding and aspirational behaviors. The guiding aspect of this responsibility includes ethical principles focused on avoiding harm and trustworthiness, while the aspirational aspect focuses on contributing to society and human well-begin. Ethical computing is often identified with the guiding principles. Though valued, they should not overshadow the aspirational aims of ethical computing. Towards this end, we advocate for a proactive pedagogy that promotes the aspirational aspects of computing for the social good throughout the computer science curriculum. This abstract presents our efforts in this direction.

Keywords: Computing Social Good Education, CSG-Ed, Ethics, Pedagogy
Categories: **Social and professional topics** → Professional Topics → Computing Education

Within computer science education, there are two fundamental principles that guide ethical thinking with respect to the impact of computing on the common social good. The first principle characterizes ethical conduct that attempts to avoid any negative impact on society, while the second attempts to intentionally make a positive impact. Examples of these guiding principles are found in the curricular outcomes specified in CS'13 [1] and ABET [2] and the ethical codes of ACM [3] and IEEE-CS [4], which include principles such as, "avoiding harm", "legal responsibility", "being trustworthy", "contributing to society and human well-being", and "recognizing that all people are stakeholders in computing".

Inherently, the deployment of software impacts society with a mixture of desired and undesired consequences. Despite this, there appears to be a common perspective that equates ethical behavior only with managing the negative impact of computing on society. Evidence for this perspective appears in the public press, e.g. [5], and the real-world case studies used in ethical computer science education, which focus on behaviors to be avoided, e.g. [6]. If we view the undesirable and desirable impacts of a computing application on society analogous to Maslow's hierarchy [7], this perspective arises since desirable impacts are attained in situations when the avoidance of undesirable consequences is also attained.

In ethical computer science education, however, it is unfortunate to allow the consideration of avoiding negative impacts on society to overshadow the desire to use computing to improve the common social good. Towards this end, we advocate for proactively educating computer science students to intentionally use computing to promote the social good. The remainder of this abstract summarizes our efforts towards goal.

Educating for the Social Good

As a computer science program within a Jesuit, values-based university, our computer science degree has included a course with ethical computing outcomes for over two decades. In 2014, we began transforming the ethical aspects of our curriculum from one that primarily focused on ethical computing conduct as avoiding negative impacts on society to one that primarily focuses on having students consider using their computer science education to intentionally change society to promote the common social good. This ongoing transformation includes changes in the curricular requirements of the program, in the outcomes of courses, in the faculty involved in developing course content, and in the pedagogy used to teach ethical thinking.

Each of these changes is motivated by insuring that students are exposed, throughout the curriculum, to examples demonstrating both the avoiding harm nature of computing's impact on society, and the aspirational desire to promote the common social good. In additional to using such examples, a pedagogy designed to encourage ethical thinking in support of the social good is used.

A key characteristic of this pedagogy is to require students to practice behaviors that intentionally support the social good. Such practice is often combined with practicing their Java programming skills. Consider, for example, user interface design, which can be localized for use with different natural languages or designed to support users with disabilities, as part of accessibility [8]. Such designs support social diversity and inclusiveness. In this context, we required students to extend the implementation of their user interfaces to support localization and accessibility. Students are also required to consider other human factor issues in their design.

As we've argued for the hierarchical nature of the guiding ethical principles, in which intentional promotion of the social good must also include avoiding negative impacts on society, we also require students to practice behaviors that would generally be considered as avoiding harm. For example, while students are not required to develop hashing/encryption schemes, they are required to utilize these where appropriate (e.g. implementing password protection).

Although we emphasize the impact of computing on the social good throughout the curriculum, we also require a senior-level Ethical Leadership in Computer Science course, with outcomes specifically focused on ethical thinking. Previously, we described how our pedagogical approach to ethics is used in this course. At that time, we defined "ethical thinking as the ability to identify all stakeholders that may be impacted by a computing solution, predict consequences, both positive and negative for such stakeholders, apply a system of ethics to analyze the above impact and consequences, and make ethically informed decisions based upon these factors" [9].

In the remainder of this abstract, we focus on how the pedagogical approach used in this course also encourages an additional focus on the common social good by teaching skills that support students in eventually becoming ethical leaders in computing. Such leadership requires, among other things, taking the initiative in promoting the common good within the computing discipline. As with other aspects of their computing education, we

believe computing leadership is based on a skill set that must be practiced. Hence, we require students to practice such leadership skills, while still in school, with the hope that this "priming" effort will better enable them to take on leadership roles in the future.

Early in this course, students are presented with, and asked to, identify existing leaders in computer science. Subsequently, the students must describe the characteristics they believe that make these individuals leaders in computing. An emphasis is placed on characteristics that promote the social good. In a similar fashion, students are presented with, and asked to, identify existing world problems, with social implications, that require a computing solution. We then operationalize our pedagogical approach by requiring students to select an unsolved, socially-minded world problem for which a computing solution is required. The students are then required to defend why they selected this problem as an exemplar of promoting the common social good. Throughout the remainder of the course, students must develop a solution plan for this world-problem. In this way, they are required to take the leaderships for the solution to a social problem of their own choice. This selection promotes student engagement and requires them to develop an ethical approach to which there is no readily available known solution, as found in a predefined case study.

Various aspects of the course content provide an understanding of what it takes to accomplish a project of this type. For example, students are encouraged to consider what it takes to put together and lead a team to accomplish the solution to the problem. This includes identifying any expertise outside of the computing discipline that might be required to carry out their solution. As another example, students are encouraged to identify how they might partner with, versus compete against, other organizations that can contribute to their solution. By the course's end, students will have created a "blueprint" of a solution to a real-world problem that would improve the social good, with the hope that they could go forward with this plan in the future (i.e. they are not asked to implement this solution, in the sense of programming).

To help increase the course quality, a multi-disciplinary faculty was used to design, teach, and improve this course [10]. Specifically, faculty with expertise in ethical philosophy, psychology, the law, and computer science have contributed. Currently, six sections have been taught by two faculty over a two year period with a new section and faculty currently in progress.

Although we are still in the process of collecting statistically significant data on our effort, informally, we have noticed a positive trend in the types of projects selected by our students. Namely, as outcomes focused on intentionally promoting the social good were added earlier in the curriculum, an increase in the types of socially-minded projects selected by the students have also increased, which suggests that that such intentional focus on using computing to promote the social good, throughout the curriculum, is advisable. In general, student and faculty feedback concerning the social focus of the project has been very positive.

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"Education Is The Most Powerful Weapon We Can Use To Change the World"
– Nelson Mandela

ABSTRACT

CS+SOCIAL GOOD: BUILDING A CURRICULAR ECOSYSTEM FOR IMPACT AT STANFORD AND BEYOND

BY
BELCE DOGRU, MATTHEW SUN, AND VIK PATTABI

Abstract

This submission introduces CS+Social Good, a student organization at Stanford University, which works at the intersection of tech and social impact. In this paper, we introduce one of our educational initiatives that might be of interest to the SIGCSE community, focusing specifically on our Studio program, which is offered as CS51 and CS52 from the Stanford University Computer Science Department. For this student-taught class, student teams partner with nonprofits and social ventures to build impactful technical projects over the course of two quarters.

Keywords: Experiential learning, Community-Engaged Learning, Project-based Curricular, Social Impact
Categories: **Social and professional topics** → Professional Topics → Computing Education

CS+Social Good grew out of the need for a unified and coordinated effort at Stanford to organize and connect students using technology to take action and collaborate on the world's most pressing problems. Our mission is to empower members of our community to leverage technology for social good by inspiring action, facilitating collaboration, and forging pathways towards change. CS+Social Good offers several courses through the CS department that address a wide variety of topics in the tech for good space. For this paper, we would like to highlight our Studio class, offered as CS51 and CS52 in the winter and spring quarters respectively at Stanford University. We also show case other classes we offer as part of our tech-for-good curriculum ecosystem.

CS51/52 Studio

Class Structure

Studio is a student designed and taught class, meaning students take full responsibility for creating the class curriculum, running class sessions and ensuring student teams are accountable to outside partners. Students who are accepted into the class are placed into interdisciplinary teams, since we believe that technologists need to partner with individuals from other fields to find efficient and ethical solutions to societal problems. These teams work with impactful social ventures or non-profits, which provide introductory challenge statements and domain guidance throughout the process. You can find a sample syllabus from this year's class at this link: http://web.stanford.edu/class/cs51/course-info.png.

Classes are composed of speakers and workshops. Over the course of the quarter, students have the opportunity to engage with multiple founders of social enterprises in small group discussion settings. These discussions are meant to give them a first hand look into what it's like to build a social enterprise. Furthermore, we hold in-class discussions throughout the quarter about working with community partners, how to engage with users, and other topics relevant to a group of people working at the intersection of tech and social impact. We also bring in experts from Stanford University's Hasso Plattner Institute of Design (also known as the d.school) and industry to give workshops on particular phases of the design process. Additionally,in order to supplement class time,we occasionally provide optional readings to be completed before class.

Throughout the quarter, teams design their own social impact projects from the ground up, completely owning each part of the process from need finding, prototyping, and user testing to implementing the final product. Each team presents on their progress three times during the quarter. The first presentation summarizes their user research and discovered needs. The second presentation summarizes how students arrived at the initial solutions for addressing those needs. The final presentation is a public showcase summarizing the design process with a focus on the improvements they've made to the prototype based on user feedback.

ThisisStudio's3rdyearbeingofferedasanofficialclassatStanford. Each year, we collect qualitative and quantitative feedback from the students in class on a biweekly basis. Based on this feedback, we fine-tune the class material to fit the interests of the students and improve on the class structure for the next year. Cumulatively, the course has taught 72 students in the class over the past three years.

Student Support

Since students at Studio are expected to complete a large scale project in two quarters, we ensure that they have a strong support structure. This is mainly done through a hardworking teaching team. The teaching team is comprised of 6-8 students who support the 25-30 students in the class throughout the course. Teaching team members take turns teaching the class sections and writing the relevant assignments.

Studio students are also assigned team coaches who are more involved in tracking the team's progress and intervening if necessary. These are teaching team members who are assigned to work 1:1 with each team. They are the team's first point of contact if the students have any questions, feel stuck, or want feedback. In the beginning of the program, the team and their coach mutually agree on a tempo for regular feed back throughout the quarter.

Throughout the year, students also remain in regular contact with a partner organization point person. These are representatives from the partner organizations with which the teams are collaborating this year. Students are encouraged to think of them as mentors with significant experience and expertise that can be helpful to their project. We emphasize that students are working with them, but not for them during the Studio program.

In the second quarter of the class, students are expected to finish implementing their projects. For this, they receive help from Student Technical Mentors. These are students with significant background in the details of implementing standalone technical projects. Students can ask them about how to learn a new coding language, how to understand the starter code, how to debug their program, how to hook up their front-end architecture to their back-end architecture, etc

Other Classes and Initiatives

CS 106S: Section

Since spring of 2016, we have offered an extra CS+Social Good Section to students in introduction to programming classes(CS106 and CS106X)at

Stanford. This weekly 2-hour section brings in engineers from tech companies and nonprofits around the Bay Area to present interactive workshops that connect Stanford's computer science curriculum to social good applications. Since2018, we have been offering this class every quarter of the academic year. Topics have included mental health chatbots, tumor classification with basic machine learning, sentiment analysis of tweets on refugees, and storytelling through virtual reality. Our goal is to make students at an introductory computer science level aware of the vast applications of tech and inspire them to use their skills for good. We have taught 66 students so far through106S.

CS53 Discussions

This past Fall quarter, we piloted CS53SI: Discussions in Tech for Good, a weekly speaker series &discussions class with the following course objectives: (a) provide a space for students to discuss the intersections of social good and technology, (b) provide accessible and relevant speaker presentations that help students better navigate these fields, and(c) enhance the community around using computer science for social good within the Stanford student body. Each class session focuses on a different intersection of tech and social good: health, education, government, poverty, race, diversity in tech, etc. We hosted ten external speakers to talk about their careers in social impact tech. Notable speakers included Andrej Karpathy (Director of AI atTesla), Jennifer Pahlka (founder and CEO of Code for America), and Sam Sinyangwe (founder at Campaign Zero). Our class size was 12 students, consisting mostly of computer science majors from all grade levels.

We also hold discussion events outside of the academic class structure; these tend to draw larger crowds of students. Last year,our signature event-brought Sal Khan, founder of Khan Academy, to Stanford. This year, we are bringing in the Theranos whistle blowers, Tyler Shultz and Erika Cheung, for a discussion event in partnership with the McCoy Family Center for Ethics in Society.

Challenges and Future Directions

Challenges with the Studio program mainly pertain to sustainability and impact. Technology is not an end-all, be-all solution, and the project hand off process each year requires a deep understanding of what the community partner is able to support and maintain sustainably. Because the teaching team changes each year, it's often difficult to keep in touch with previous partners and track impact over long periods of time. Past partners have included Second Harvest Food Bank, Google.org, Project Homeless Connect, and Tech Hire Oakland. Finally,because our projects often require work with marginalized communities, it's important to ensure that our relationship to them is not exploitative.

In terms of future directions, our organization is excited about growing the tech-for-social-impact sphere across the country and world through TechShift (https://www.techshift.co), an alliance of tech for good organizations on college campuses which we helped grow as a founding member. Tech Shift periodically accepts applications from students who want to start their own CS+Social Good organizations, and it provides them with mentorship and resources to grow.

In addition, we are also looking into implementing institutional change at Stanford by working closely with departmental and university contacts. We are currently exploring certificates, honors programs, minors, majors, notations, curricula, etc. as potential pathways to recognize and encourage students who want to pursue tech for impact work during their time at Stanford.

Acknowledgements

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ABSTRACT

RACE AND GENDER IN SILICON VALLEY

BY
CYNTHIA LEE

Summary

I am a Lecturer of Computer Science, and typically teach programming (CS2 and systems) and theory (discrete math and automata) course. This autumn, I introduced a new seminar course, Race & Gender in Silicon Valley, offered in the Computer Science Department but in a format more typical of a humanities or social science course. One of the primary feedbacks from students about the course was that every computer scientist should be required to learn this material! I believe that presenting the syllabus and an overview of the students' class projects would be useful for attendees of the mini-symposium, either to inspire similar courses at other universities, or simply to give faculty ideas for individual readings and modules that they might insert into other courses at different levels, such as a CS Principles or Machine Learning. Some of the student projects were also on the topic of repackaging the course for a target audience of high school students, so K12 educators at the mini-symposium would also have directly actionable takeaways. (Course syllabus on the web: http://bit.ly/racegenderinsiliconvalley)

Keywords: Computing for Social Good, Race and Gender
Categories: **Social and professional topics** → Professional Topics → Computing Education

Course Description

Join us as we go behind the scenes of a year of big headlines about trouble in Silicon Valley. We'll start with the basic questions of who decides who gets to see themselves as "a computer person," and how do early childhood and educational experiences shape our perceptions of our relationship to technology? Then we'll see how those questions are fundamental to a wide variety of recent events from #metoo and the fight against sexual harassment in tech companies, to how the under-representation of women and people of color in tech companies impacts the kinds of products that Silicon Valley brings to market. We'll see how data and the coming age of AI raise the stakes on these questions of identity and technology: Exactly how much do companies like Amazon, Google, and Facebook know about you, and how could that data be used to target you in potentially harmful ways? How can we ensure that AI technology will help reduce bias in human decision-making in areas from marketing to criminal justice, rather than amplify it?

Course Goals

- Students will learn to become skilled interpreters of the social and cultural challenges that Silicon Valley faces with respect to the power dynamics of race, class, gender, health status, and citizenship status.
- Students will be able to theorize their own lived experiences as consumers of technology and in computer science classrooms and workplaces. That is, they will be able to identify systemic and structural patterns at work in their own lives.
- Students will be able to make a significant contribution to raising awareness of and/or mitigating challenges related to diversity and inclusion in the tech workforce and/or its products.
- Students will be able to reinterpret what they have learned in a language and packaging appropriate for middle school and high school learners.

Schedule of Readings

Week	Topic	Reading
1	Workforce diversity: history	Brotopia Ch. 1 (pp.15-36--this skips the last few pages of the chapter)
2	Education and student identity formation: who thinks "I'm a CS person" today and why?	Godwin, Potvin, Hazari, Lock "Identity, Critical Agency, and Engineering: An Affective Model for Predicting Engineering as a Career Choice"; Tracy Chou, "'I had so many advantages, and I barely made it": Pinterest engineer on Silicon Valley sexism"; Ben Williams, "Debugging Code(Switching): My Experiences as a Black Computer Science Student at Stanford University"; Alona King, "No, I Am Not Lost A Black woman's experience in the Stanford Computer Science Major"
	Education and student identity formation: social and ethical frameworks of solutions	Inclusive classroom tips list (http://bit.ly/inclusivecs); Sepehr Vakil, "Ethics, Identity, and Political Vision Toward a Justice-Centered Approach to Equity in Computer Science Education"; King: "Letter from the Birmingham Jail"
3	Workforce diversity today: Utopianism, Meritocracy, and their dissenters	Brotopia Ch. 2; Susan Sibley "Why Do So Many Women Who Study Engineering Leave the Field?"; Alison Wynn, Shelley Cornell "Puncturing the pipeline: Do technology companies alienate women in recruiting sessions?" Critical Ethnography. Method, Ethics, and Performance (we will read this last one together in class)
	Data Bias: race, gender & search engines	Algorithms of Oppression (the whole book is on reserve in the library, and is encouraged, but it is only required for today's class to watch video: http://www.youtube.com/watch?v=iqt3ic56-rc

Week	Topic	Reading
4	Interface Bias: forms	Sara Wachter-Boettcher, Technically Wrong: Sexist Apps, Biased Algorithms, and Other Threats of Toxic Tech (book is on reserve at the library; only one chapter reading is required TBA)
	Construction of masculinity in geek culture	Fred Turner (interview), "Don't Be Evil: Fred Turner on Utopias, Frontiers, and Brogrammers"; Jonathan McIntosh, "Playing with Privilege: the invisible benefits of gaming while male"; Betsy DisSalvo "Gaming Masculinity: Constructing Masculinity with Video Games"
5	Construction of masculinity in geek culture	Noam Cohen, "We're All Nerds Now"; Betsy DiSalvo et al. "African American Males Constructing Computing Identity"; Kristin A. Searle and Yasmin B. Kafai, "Boys' Needlework: Understanding Gendered and Indigenous Perspectives on Computing and Crafting with Electronic Textiles"
	Education and workforce diversity today: the backlash	James Damore Memo; Stuart Reges Memo; The Economist editorial staff, "The e-mail Larry Page should have written to James Damore"; Cynthia Lee on the Google Memo
6	Workforce diversity today	Susan Fowler "Reflecting On One Very, Very Strange Year At Uber"; Brotopia Ch. 4-5
	Data Bias: voice assistants	Adrienne LaFrance "Why Do So Many Digital Assistants Have Feminine Name?
7	Data Bias: class and poverty	Virginia Eubanks, Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor
	Data for good: policing police	Voigt et al. "Language from police body camera footage shows racial disparities in officer respect", Elora Israni "When an Algorithm Helps Send You to Prison"

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Photo: Elf @ wikipedia.org/wiki/Silicon_Valley

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ABSTRACT

ENCOURAGING CS STUDENTS TO COMPUTE FOR SOCIAL GOOD THROUGH COLLABORATIVE, COMMUNITY-ENGAGED PROJECTS

BY
S. MONISHA PULIMOOD, KIM PEARSON, AND DIANE BATES

Abstract

Which pedagogical techniques better engage computer science (CS) students in computing for social good? We examine this question with students enrolled in classes using the Collaborating Across Boundaries to Engage Undergraduates in Computational Thinking (CABECT) pedagogical model, that pairs CS and non-CS courses with a community partner to propose solutions to a local problem. Pre- and post-tests of self-assessed concerns about civic responsibility, global responsibility, and local civic efficacy were administered to the students in a three-year long pedagogical experiment, which paired five CS courses with five journalism courses. While CS students were not statistically different from their journalism peers in pre-test measures of social and global responsibility, they lagged behind in local efficacy. In the posttest, CS students had significantly increased their sense of local efficacy to the extent that they were statistically indistinguishable from journalism students. Community-engaged learning projects, such as the one in the CABECT model, show great potential for attracting students to computing for social good.

Keywords: Civic Engagement, Computing for Social Good, Community-Engaged Learning
Categories: **Applied Computing** → Education → Collaborative Learning

Computing for social good (CSG) charges computer science (CS) educators to consider how students can use their disciplinary skills to improve social and environmental well-being. These questions are central to the Collaborating Across Boundaries to Engage Undergraduates in Computational Thinking (CABECT) pedagogical model, where CS classes were teamed with non-CS classes to develop solutions to a community-identified problem of determining levels of ground contamination on future build sites.

The Social Issue

Environmental testing and mitigation have made it increasingly difficult for Habitat for Humanity to build homes that are affordable for its target clients. In fact, Habitat for Humanity has turned down land donations because of the cost of testing and the potential liability for mitigation. The regional Executive Director of Habitat for Humanity asked for a computer-based system that would estimate the likelihood of contamination on any given plot of land, prior to expensive environmental testing.

The Pedagogical Model

CS and journalism classes were run separately with their own learning goals and associated assessments, but each contained assignments structured around the collaborative creation of a webbased system designed to provide accurate, accessible and comprehensive information on whether sites may be polluted. After being introduced to the collaborative project on the first day of class, students met jointly four times throughout the semester. At the initial meeting, the Executive Director from the local Habitat for Humanity chapter explained how the lack of accurate pollution information complicates their efforts to provide affordable housing. Students next met to brainstorm ideas to create, or improve existing, software modules that would help address the problem. Small groups of CS and journalism students continued to meet outside of class to continue working on the project. The journalism students were responsible for identifying credible data sources and creating content, while the CS students were responsible for the design and development of the computational solution. A third joint class involved a field trip to the neighborhood that Habitat for Humanity was working to redevelop. At the end of the semester, the students presented their software modules to the Executive Director of Habitat for Humanity, and other interested stakeholders.

The Study

Student outcomes were measured through self-assessments in pre- and post-tests in five paired classes over four semesters. As seen in Table 1, in one semester, two courses from each discipline were included in the study; in all other semesters, only one course from each discipline was included. CS and journalism groups are non-equivalent, so a non-comparable groups experimental design was employed. Pre-tests were administered in person as paper surveys on the first day of class, following an explanation of the project and a review of human subjects' protection. Post-tests were administered electronically using Qualtrics software.

Table 1: Collaborating Classes, by Semester

Semester	CS Course	Journalism Course
Spring 2013	Software Engineering	Blogging and Social Media
Fall 2013	Database Systems Software Engineering	Health and Environmental Journalism News Games
Spring 2014	Software Engineering	Future of the News
Fall 2014	Software Engineering	Health and Environmental Journalism
Spring 2015	Software Engineering	Blogging and Social Media

Measurement

Items were adapted from Mabry [3], Lerner et al [2], and Bobek et al [1] scales measuring Civic Attitudes (5 items), Social Conscience (5 items), and Positive Civic Attitudes (7 items). Factor Analysis identified two factors and one item that did not load. An index was created from each factor to measure Social Responsibility and Local Efficacy; both had high internal reliability in both pre- and post-tests. The item that did not load was kept as a single item (Global Efficacy).

Social Responsibility included items such as, "People, regardless of whether they've been successful or not, ought to help others" and "It is important

to help others even if you don't get paid." Global Efficacy included the item "I feel that I can make a difference in the world." Local Efficacy included items such as, "I believe I can make a difference in my community," "I often think about doing things so that people in the future can have things better" and "It is important to me to contribute to my community and society.

Findings

In the pre-test, analysis of variance (ANOVA) indicates that students in the computer science and journalism classes were statistically different ONLY in the local efficacy index ($F = 18.817$, $p = .000$). In the post-test, analysis of variance (ANOVA) indicates that students in the computer science classes were no longer statistically different from the students in the journalism classes. Paired sample t-tests also indicate that the only statistically significant difference from pre-test to post-test is in the local efficacy index ($t = -9.982$, $p = .000$). Participation in these courses had little effect on how the students viewed social responsibility generally or how they felt about the difference they could make in the world abstractly. At the same time, all students increased their sentiment of local efficacy, indicating that after participating in the collaboration, they increased their sense of responsibility for, and ability to make a difference in, their immediate communities (see Table 2). CS

students, who reported a much lower sense of local efficacy than the students in the journalism classes at the outset, statistically demonstrated the same levels of local efficacy as their journalism peers in the post-test. The pedagogical model thus had a positive impact on all students in terms of increasing their sense of local efficacy, but this impact was much stronger among CS students.

Table 2: Mean Changes from Pre-to Post-test, by discipline

Mean Changes	CS	JPW	Total
Social Responsibility	+.05	+.07	+.03
Global Efficacy	-.05	-.29	-.10
Local Efficacy	+12.81	+5.88	+11.22

This change was achieved even while evidence of computational thinking increased among all groups of students. On all measures of computational thinking, all measures increased from pre- to post-test, with the only significant difference was that the mean change in "I can use abstractions" was statistically greater for students in computer science courses than in journalism courses ($F = 4.546$, $p = .038$). See [4, 5] for a thorough examination of the computational learning goals in this project, and more details of the study.

Discussion

Computing for Social Good (CSG) in the undergraduate CS curriculum should provide opportunities for students to apply their developing skills to community-identified problems in need of computing solutions. The CABECT experiment demonstrates that while community-engaged learning may have limited effect on abstract ideas about social and global responsibility, when CS students participate in these activities, they develop a stronger sense of their own abilities to make positive changes in their communities.

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ABSTRACT

BREAKING BARRIERS, BUILDING UNDERSTANDING: A MULTIGENERATIONAL APPROACH TO DIGITAL LITERACY INSTRUCTION FOR OLDER ADULTS

BY
KELLY STEELMAN AND CHARLES WALLACE

Abstract

In entering the digital realm, older adults face obstacles beyond the physical and cognitive barriers traditionally associated with accessibility. One of these obstacles, technology related anxiety, is particularly problematic because it discourages exploration and way finding, two behaviors critical to the development of digital literacy. We see opportunities to address this issue and bring isolated older adults into a larger digital community, while simultaneously offering our students with valuable first-hand experience learning about and addressing the challenges faced by capable people struggling with unfamiliar technology. Here, we describe our social-cognitive approach to training digital literacy skills,pairing university student tutors with learners from the local community.

Keywords: Civic Engagement, Computing for Social Good, Community-Engaged Learning
Categories: **Applied Computing** → Education → Collaborative Learning

The Need

As the critical functions and services of our society — job applications, healthcare resources, banking functions — move primarily or wholly online, a never-growing number of citizens are compelled to adopt digital technology. Form any, technology related anxiety (TRA) constitutes a formidable barrier to entry into the digital world [4]. For digital adopters experiencing TRA—many though not all of whom are older adults — the perception of risks, known and unknown, associated with the technology hinder a robust learning experience. These reluctant users are likely to be marginalized as they fail to thrive in an increasingly digital-only world. In supporting the development of our technically adept students —the designers of tomorrow's digital technology—we face a different challenge: how to expose these students to the experiences of users who are not like them. In many academic settings, teaching and research on user-centered design follows a path of least resistance: design by students, for students, tested on students[2].

Our local community thus affords a unique and invaluable educational opportunity for our undergraduate and graduate students. By harnessing their expertise to the cause of educating older adults, we can provide students with first-hand experience addressing the issues that many elders confront when engaging with technology.

The Challenge

Since 2011 our Breaking Digital Barriers research group has offered one-on-one digital literacy tutoring in our local community, through the BASIC (Building Adult Skills in Computing) program [1,7]. Many of our patrons seek our services precisely because they have been forced to adopt a new technology; faced with what are in reality quite surmountable obstacles, they experience anxiety and shutdown. Our experiences and research with these patrons suggests that the effects of TRA extend well beyond adoption, stifling the exploration needed to develop digital independence [5,7]:

- A common concern for patrons is that they may inadvertently break" their device, software, or even the Internet. Even routine activities may cause anxiety as users fear accidentally going "off script".
- A shift toward mobile devices with small displays and a shift toward "clean" design have led to a decrease in affordances and other cues in user interfaces. To use these interfaces effectively, the user must be willing to explore the space and uncover the functionality. A change triggered by an inadvertent action makes users feel anxious and out of control.
- Media stories of fraud and identity theft leave some of our patrons wary of going online, visiting certain websites, downloading apps or software, and even accepting important security updates. Without an understanding for how malware and other threats work, they have no model for how to minimize their threat level.
- Anxious learners over-rely on script-based style of learning. Although rote memorization of steps may be effective in the short-term, this strategy fails when learners try to perform a similar task on a different device or after a system update.

These observations suggest that an effective digital literacy program cannot simply focus on rote step-by-step instruction. Interface designs change; operating systems are updated and upgraded; apps and services come and go. Accordingly, we seek a deeper type of learning for our digital new comers. What are the higher order skills that we"experts"embody and that w e wish to encourage? Mirel asks a similar question in her seminal work on complex computer mediated problem solving. She defines way finding as the "process of organizing and finding away through dynamic explorations and analyses"[6]. True way finding is more than simply reacting to a understanding of the current situation, the desired outcomes, and the possible paths toward those outcomes. While Mirel has focused on experienced, highly confident users working on complex problems, the challenges faced by digital newcomers as they enter the digital world are no less substantial. In contrast to the deliberate, goal-directed behavior associated with way finding, exploration is a heuristic that searches for affordances and traverses functionalities in a breadth-first fashion [9]. While less deterministic in its nature, it is no less purposeful than way finding; the goal is to survey and assess directions that can be used in way finding. A key assumption of the activity is the "Safe Exploration" pattern of interface design [8], which affords whenever possible the choice to back out and try other options

Our Approach

Our BASIC program focuses on the higher order skills that are essentia lforkeeping up with the rapid pace of technological change and transferring knowledge from task to task or system to system. Bandura's Social Cognitive Theory[2,3] provides a set of guiding principles for our efforts, through its emphasis on the roles of observational learning and behavior modeling, learner-led goal setting, and the development of self-efficacy: Observational

Learning and Modeling. The most basic instructional implication of Social Cognitive Theory is that learners require access to models of the knowledge, skills, and behaviors they are expected to learn. Multiple types of models (e.g.,instructors,peers) and various forms of modeling (e.g., cognitive, verbal, mastery, coping) should be used. Instruction must support learners' engagement in observational learning.

> Keith, Student Tutor: When first using a device such as a tablet, there may be a very short instruction on how to use some features, but normally there is nothing beyond telling the user to open an apps menu. This is a greatly overlooked issue, especially because people tend to exhibit a fear of breaking the device, they do not "play around", so without any instruction it is frustrating to the user.

Goal Setting. According to Social Cognitive Theory, instruction should help students set goals that are attainable, clear, specific, and moderately challenging. To facilitate progress and self-efficacy, learning goals should be attainable with moderate levels of effort. Goals that learners set or endorse themselves have a bigger effect on their behaviors than do goals that are assigned.

> Jaclyn, Student Tutor: One good rule of thumb is to always ask why a patron is trying to learn or do something. Like during requirements gathering, people often ask for what they think they want instead of what they actually want... Asking why and what they want to accomplish not only helps identify these confusions, but it also gives you an idea of what the person already knows.

Perceived Self-Efficacy. Social Cognitive Theory asserts that people will be more active, effortful, and effective learners when they are confident in their ability to complete tasks successfully. Instruction should be designed to help learners develop and sustain self-efficacy: the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations. As part of on going assessment of our BASIC tutoring program, we have collected data from our more experienced tutors[7]. Use of the Critical Decision Method [3], an incident-based cognitive task analysis technique that helps experts tell stories from their field, revealed a five-step model of the tutoring process:

(1). Introduction: Establish a working relationship between the tutor and the patron, and determine the patron's motivation for using technology.

(2). Triage: Gather information to develop a mental model of the patron's desired task and the patron's level of digital literacy.

(3). Planning and Preparation: Develop a plan for helping the patron and determine the information, skills, and resources needed to implement the plan.

(4). Implementation: Teach the patron how to solve the problem and/or fix the problem for the patron.

(5). Conclusion: Recap what was accomplished and make a plan for continued learning. Patron and tutor revisit Steps 2-4 repeatedly, with results from Steps 3 and 4 providing input for reassessment in Step 2.

Through participation in the BASIC program, students get firsthand insights into the challenges facing older adults, build their empathy for users of technology, and engage in important analytical and pedagogical practices. Building upon this work, the students and faculty in the Breaking Digital Barriers team are refining and testing a new learning model that seeks to mitigate anxiety and strengthen development of higher order skills, through scaffolded technological assistance. The first objective is to develop a toolkit allowing website developers to implement accessibility functions that encourage exploration, reveal hidden functions, and allow users to create dynamic annotations to serve as memory aids. The second objective is to implement and test these tools within a digital literacy tutoring program, to assess the development of way finding and exploration skills and overall technological self-efficacy.

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PARTING OPINION

WHEN VOTING, TRUST COMPUTER SCIENTISTS: NOT COMPUTERS?

BY RICHARD BLUMENTHAL

Keywords: Suffrage, Electronic Voting, ACM Technology Policy Committee
Categories: Social and professional topics - Computing / technology policy

"The right of suffrage is a fundamental Article in Republican Constitutions"[6]

As a Computer Scientist and SIGCAS member, I don't know whether to be appalled or proud. To understand why I might be *appalled*, consider the recent New York Times headline [3],

"*'A Systemwide Disaster': How the Iowa Caucuses Melted Down*"

As background for our international SIG members, the process of electing the 2020 United States President began with the Iowa state caucuses. In a caucus, as opposed to a "primary" election, members of a party from a local municipality meet to debate and select a nominee. The number of people participating is typically small and from a local community. At the end of the caucus, support for each candidate is tallied and delegates are selected to cast votes for their nominee at a subsequent state convention with the winner being the nominee from that state. In 2020, the Democratic party of Iowa automated the gathering and reporting of caucus votes to the state using a mobile app, which failed in a number of ways, which are still being investigated [2].

To understand why I might be *proud*, in 2004, ACM adopted a position on E-Voting that addresses protecting the accuracy and impartiality of the electoral process, which was supported by 95% of the membership. The *ACM Statement on Voting Systems* states

> "To protect the accuracy and impartiality of the electoral process, ACM recommends that all voting systems—particularly computer-based electronic voting systems—embody careful engineering, strong safeguards, and rigorous testing in both their design and operation" [3]. In addition, ACM recommends that "all voting systems should enable each voter to inspect a physical (for example, paper) record to verify that his or her vote has been accurately cast and to serve as an independent check on the result produced and stored by the system. Making those records permanent (that is, not based solely in computer memory) provides a means by which an accurate recount may be conducted. Ensuring the reliability, security, and verifiability of public elections is fundamental to a stable democracy" [5].

As the Iowa "meltdown" occurred as part of a caucus, which inherently creates a paper trail, there wasn't a real reason to panic, but had this been an election without a paper trail, then a real "disaster" would have occurred.

Not convinced, consider the 2018 report cosponsored by the *ACM U.S. Technology Policy Committee*, which included the findings, "Federal government, military and private sector studies have examined the feasibility of Internet-based voting and have concluded it is not secure and should not be used in U.S. government elections" [4]. The same report also noted "that thirty-two U.S. states permit Online voting from some subset of voters" and "in the 2016 general election, over 100,000 ballots were reported to have been cast Online" [4]. Additionally, and despite the well-meaning intensions of computer scientists working on technologies to improve electronic voting, this report also found that emerging technological solutions to electronic voting, such as block-chain voting and end-to-end verifiable systems "fail to address many of the fundamental and universal security challenges inherent to Online voting..." [4].

From my perspective the recommendations in the ACM Statement on Voting Systems [5] and Email and Internet Voting [4] report appear not only reasonable, but necessary to ensure "the right of suffrage". This raises the question of how might the computing community, in general, and our SIG, specifically, support these recommendations? Certainly, we could advocated for laws that enforce the recommendations found in these statements. However, lacking such laws, I'd recommend the computing community refuse to develop electronic voting applications that violate these recommendations. I can imagine a number of ways we might be able to self-enforce such a policy, but, instead, I ask our community how we should proceed.

Lest you think such a position to be too Draconian, with the exception of existential threats, I'm not sure there is a bigger risk facing humanity. Consider the fact that in democratic republics, citizens continue to serve in their respective military to protect rights, such as suffrage. If so many are willing to give their lives to protect these rights, shouldn't we, the computing community be willing to take a stand to secure these rights from risks introduced by technology?

Speaking of risk, Charette observes that "risk concerns future happenings... The questions is, can we therefore, by changing our actions today, create an opportunity for a different and hopefully better situation for ourselves tomorrow " [1]. As students learn in any Software Engineering course, there are a plethora of ways to help mitigate risk ranging from testing to formal methods for verifying code and I teach my students to weigh the benefits of an application against the risk of failure. What if the risk of failure is too great, even if the application works correctly, but, for example is denied service?

As pressure builds for E-Voting, our community faces a choice, guarantee the security and validity of every E-Vote by strictly adhering to the recommendations of computer scientists or refuse to create such a risky technology.

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