

Evolving Academia/Industry Relations in Computing Research

Ben Zorn

Microsoft Research &
Chair, CCC Industry Working Group

July 2019



CCC

Computing Community Consortium
Catalyst

Computing Community Consortium

Mission: **catalyze** the computing research community and **enable** the pursuit of innovative, high-impact research.



What:

- Promote audacious thinking
- Inform research directions
- Human development
- Standing committee of the CRA since 2006

How:

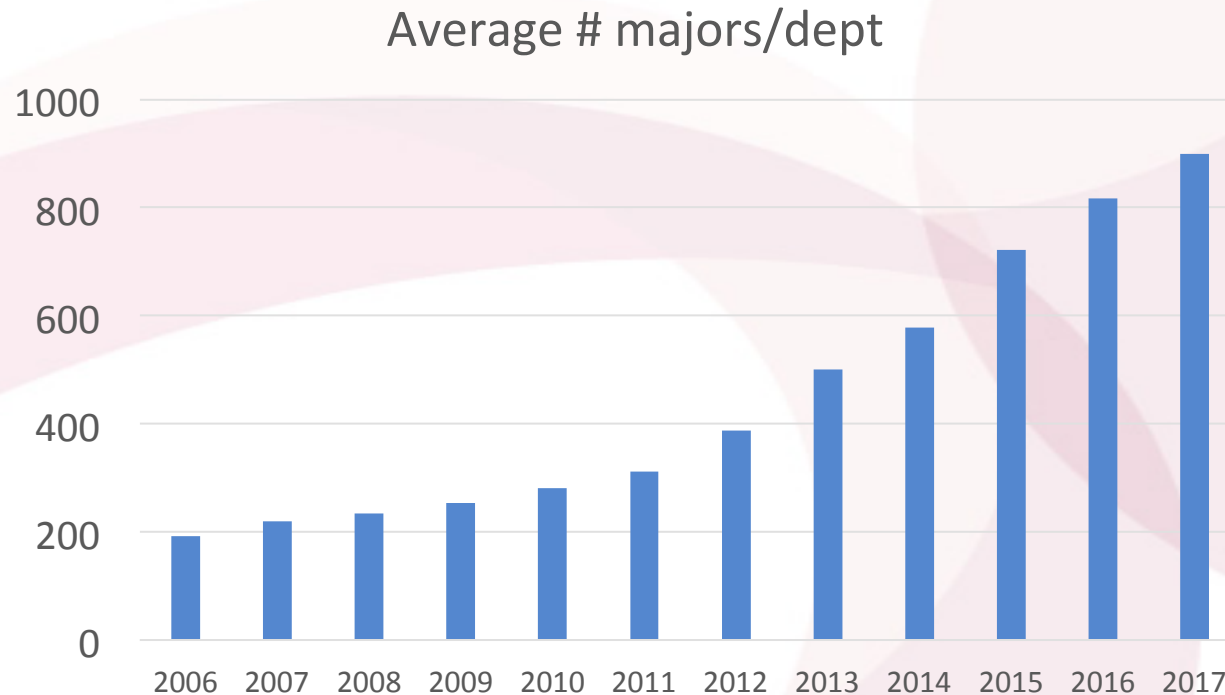
- Workshops & Conf. Blue Sky Tracks
- Whitepapers & Social Media
- Reports Out (esp. to government)
- Biannual Symposium



CCC

Computing Community Consortium
Catalyst

Background: Growing CS Enrollment



<https://cra.org/data/generation-cs/phenomenal-growth-cs-majors-since-2006/>

Source CRA Enrollment Survey

The Hard Part of Computer Science? Getting Into Class

New York Times, Jan. 24, 2019



CCC

Computing Community Consortium
Catalyst

Background: Computers Everywhere



Yes, this is a
computer too

STATE OF THE ART

*A Future Where Everything Becomes a
Computer Is as Creepy as You Feared*

New York Times, Oct. 10, 2019



Amazon
Echo



Ring.com



CCC

Computing Community Consortium
Catalyst

CCC Industry Working Group

- Members: Ben Zorn, Greg Morrisett, Shwetak Patel, Jennifer Rexford
- Started in 2018 – mission to understand academia/industry relations
- Building on 2015 report
“The Future of Computing Research: Industry-Academic Collaborations”
- We started with question

“Have things changed since 2015?”



Our Conclusion: Major Changes since 2015

- Process:
 - Interviewed individuals including deans, CS department chairs, CS faculty, individuals at start-ups and large companies
 - Released an interim report & final report to inform community:
Evolving Academia/Industry Relations in Computing Research



Evolving Academia/Industry Relations in Computing Research

Shwetak Patel (Univ. Washington), Jennifer Rexford (Princeton Univ.),
Benjamin Zorn (Microsoft), Greg Morrisett (Cornell Univ.)
Industry Working Group, Computing Community Consortium (CCC)
June 2019

Executive Summary

In 2015, the CCC co-sponsored an industry round table that produced the document "The Future of Computing Research: Industry-Academic Collaborations."¹ Since then, several important trends in computing research have emerged, and this document considers how those trends impact the interaction between academia and industry in computing fields. We reach the following conclusions:

- In certain computing disciplines, such as currently artificial intelligence, we observe **significant increases in the level of interaction between professors and companies**, which take the form of extended joint appointments.
- Increasingly, **companies are highly motivated to engage** both professors and graduate students working in specific technical areas because companies view computing research and technical talent as a core aspect of their business success.
- There is also the further potential for principles and values from the academy (e.g., ethics, human-centered approaches, etc.) informing products and R&D roadmaps in new ways through these unique joint arrangements.
- This increasing connection between faculty, students, and companies **has the potential to change (either positively or negatively) numerous things, including:**
 - The academic culture in computing research universities
 - The research topics that faculty and students pursue
 - The ability to solve bigger problems with bigger impact than what academia can do alone
 - The ability of universities to train undergraduate and graduate students
 - How companies and universities cooperate, share, and interact
- This report is the first step in engaging the broader computing research community, raising awareness of the opportunities, complexities and challenges of this trend but further work is required. **We recommend follow-up** to measure the degree and impact

¹ <https://cra.org/ccc/industry/>



Key Findings

- In certain areas of computing research, we observe **significant increases in the level of interaction between professors and companies**, often in the form of joint appointments
- **Greater engagement has benefits** including greater access to data and compute resources, engineering talent, opportunity for impact, and the ability to shape corporate vision
- Universities need to adapt to accommodate these changes and **avoid potential negative impact**, including on students, culture, and academic principles
- **Follow-up is required** by an organization like the CRA so that:
 - Trends are measured and understood
 - Best practices are documented and shared between universities for greater leverage
 - Students and university administrators need to be aware of these changes and plan accordingly



CCC

Computing Community Consortium
Catalyst

Key Findings

- Significant increase in faculty joint appointments
- Increased connections may have systemic positive and negative impacts
 - Benefits of enhanced collaborations
 - Impact on university culture and education
 - Impact on research agenda
 - Awareness of conflicts of interest
- Guidance is required to avoid the worst of the negative impacts



CCC

Computing Community Consortium
Catalyst

Increases in Faculty Joint Appointments

- More faculty are having joint appointments
- Arrangements include more time at companies:
 - 50/50- half time at company
 - 20/80 – 80% at company
 - Indefinite duration
 - Universities are developing new and novel arrangements as a result
- Industry engagement extends beyond faculty to graduate students
- Why?
 - Increased demand for talent
 - Access to data, compute, engineers – allow more ambitious research
 - Ability to have impact
 - Salary



CCC

Computing Community Consortium
Catalyst

Positive aspects of academia/industry engagement

- Potential to improve the research by informing it through deployment, real-world aspects
 - Increased resources can lead to greater ambition, bigger impact
 - Some research cannot be done without company participation
 - Academics can have positive impact on corporate culture
-
- Our goal – preserve all the positive aspects while minimizing the negative ones



CCC

Computing Community Consortium
Catalyst

Institutional impact

- If a professor is 50/50, what 50% at university are they not doing?
- University culture
 - Impact on university/professional service, committees such as admission and hiring
 - Impact on mentoring, face time with students
- University education mission
 - How do universities adjust for 50/50 faculty?
 - How are teaching faculty affected?
 - Are graduate students also less likely to work as TAs?
 - How are undergraduates impacted?
 - Will undergrads will do research?



CCC

Computing Community Consortium
Catalyst

Research Agenda Impact

- The research agenda of both professors and the graduate students who work with them can be significantly influenced by the company
- Industry research
 - Can be shorter-term, more directly connected to products and profit potential
 - Can shift quickly based on market considerations, reducing support for agendas that required sustained investment
- Some aspects of research may not be published due to IP, competitive concerns



CCC

Computing Community Consortium
Catalyst

Conflict of Interest Considerations

- A 50/50 faculty has two equal affiliations: university and company
- As mentor/advisor, the faculty must act in the best interest of the student, especially because a power differential exists
- Students must have
 - A clear understanding what their obligations are to company, how they related to their degree
 - Clear options in case they believe their best interests are not being served
- Professors may need to more clearly identify their affiliations when reporting their work

Call to Action – New Opportunities

- Greater connection implies more influence:
 - Leverage greater engagement between academia and industry to bring principles of academia to bear on a wide range of important problems
- Encourage co-location and shared challenges:
 - Companies are already building labs co-located with universities
 - Competitions bring companies/universities together to work on shared, pre-competitive grand challenges (e.g., DARPA Autonomous Vehicle competitions)
- Require greater transparency
 - Disclosure of their affiliations is more important than ever
 - Reviewers need to understand conflict of interest, students need to understand IP restrictions



CCC

Computing Community Consortium
Catalyst

Faculty Agreement Guidelines

- Many different arrangements are already being made
 - From disallowing altogether to broad, open agreements
 - Experimentation is necessary to understand best practices, pitfalls
- Key elements
 - Protect students, ensure transparency of the commitment, and give them information needed to make good decisions
 - Ensure fairness across department (including impacts on teaching faculty)
 - For longer term arrangements (beyond 2-year limits, overall management plan for teaching, department service, etc. is important)



CCC

Computing Community Consortium
Catalyst

Steps Beyond the Interim Report

- Community feedback is a key goal (please send!)
- Expand data gathering
 - How extensive is the issue? By department, by research area, by geography?
 - Is this a long-term trend? What if it is not?
- Understand best practices of current faculty/student arrangements
 - Ensure arrangements avoid pitfalls related to IP, COI, etc.
- Document novel company approaches to deepening academic engagement
 - Lablets, joint research efforts, funded programs



CCC

Computing Community Consortium
Catalyst

Questions?

- Final report draft available (shared with CRA)
- Give us feedback!
<https://www.cccblog.org/2019/03/06/evolving-academia-industry-relations-in-computing-research-interim-report-released-by-the-ccc/>
- Contact me:
zorn@Microsoft.com
On twitter: @benzorn



CCC

Computing Community Consortium
Catalyst