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Viewpoint

Long-Term Mentoring for Computer Science Researchers

Reaching out across computer science research communities.

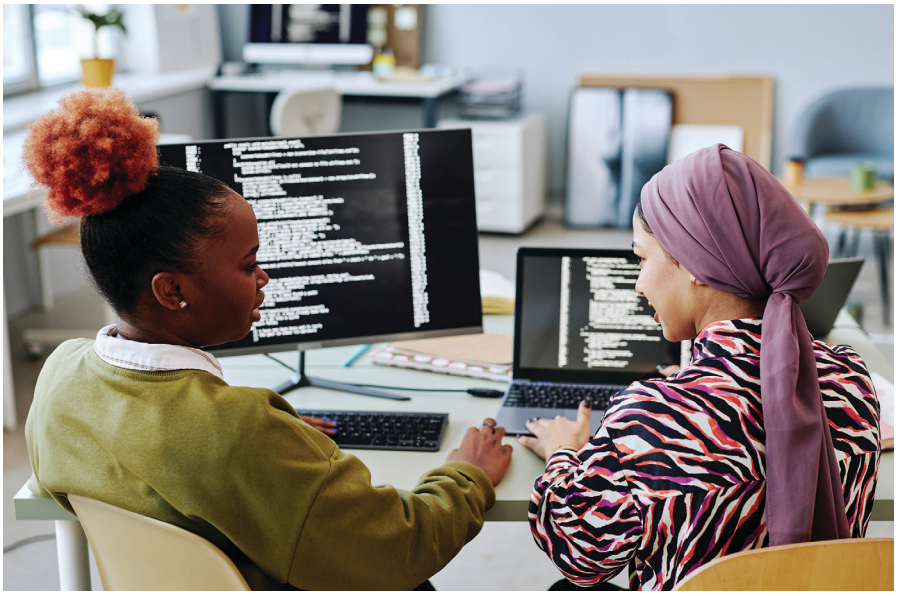


IMAGE BY SEVENTYFOUR

EARLY IN THE COVID-19 pandemic, we—leaders in the research areas of programming languages (PL) and computer architecture (CA)—realized we had a problem: the only way to form new lasting connections in the community was to already have lasting connections in the community. Our academic communities had wonderful short-term mentoring programs to address this problem, but it was clear we needed long-term mentoring programs.

Those of us in CA approached this scientifically, making an evidence-backed case for community-wide long-term mentoring.[1] In the meantime, one of us in PL had impulsively launched an unofficial long-term mentoring program, founded on chaos and spreadsheets. In January 2021, the latter grew to an official cross-institutional long-term mentoring program called SIGPLAN-M; in January 2022, the former grew to become known as Computer Architecture Long-term Mentoring (CALM).

The impacts have been strong: at the time of writing this Viewpoint, SIGPLAN-M reaches 328 mentees and 234 mentors across 41 countries, and mentees have described it as "life changing" and "a career saver." And while CALM is in its pilot phase—with 13 mentors and 21 mentees across seven countries—it has received very positive feedback. The leaders of SIGPLAN-M and CALM shared our designs, impacts, and challenges along the way. In this Viewpoint, we wish to share those with you. We hope this will kickstart a larger long-term mentoring effort across all of computer science.

Designing a Long-Term Mentoring Program

We designed SIGPLAN-M and CALM to address two gaps in our communities: helping junior and aspiring researchers form long-term connections in our communities, and access the perspectives of researchers from other institutions (CALM and SIGPLAN-M); and helping senior researchers access mentorship of any kind (SIGPLAN-M only).

Organization. Both SIGPLAN-M and CALM are run by volunteers. Both programs have an operations committee of junior researchers who handle matching, recruitment, and other operational tasks. SIGPLAN-M also has an advisory committee of senior researchers who help communicate with leadership in SIGPLAN and the ACM. CALM is developing a similar advisory committee, which is especially useful given that CA spans both the ACM and IEEE.

Scope. SIGPLAN-M is open to any seniority level in any country—see the accompanying figure for a cur-

rent breakdown. It is possible to serve as both a mentee and a mentor at the same time (this is common, and helps with mentor recruitment). CALM is similarly global, but is piloting for students. The scope of mentoring can be any mix of technical and non-technical (career) topics, including the experiences of historically marginalized groups in computing.

Recruitment. Both CALM and SIGPLAN-M recruit mentors and mentees in batches before conferences. This makes it possible for us to reuse conference registration infrastructure, and to piggyback off of existing outreach and recruitment efforts for colocated short-term mentoring workshops. SIGPLAN-M also recruits off-cycle on a rolling basis via registration forms on our website, and using social media, flyers, stickers, and presentations at major conference business meetings. We occasionally target mentor recruitment toward particular needs.

Registration. The registration forms ask participants their motivations, topics of interest, and topic priorities. Their open-ended questions allow for both flexibility in answers and vetting of participants. The SIGPLAN-M forms also provide example topics, including some that may be taboo (such as mental health). They also include fields for preferred matches and matches to avoid.

Matching. We form matches based on registration data, using guidelines discussed and revised in committee meetings. We deliberately form cross-institutional matches. If no match is available, we waitlist mentees and revisit. After matching, we email the mentor and mentee to initiate the relationship, using a set of shared email templates.

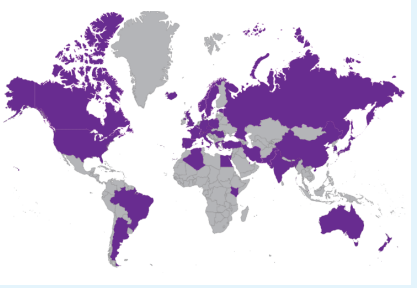
We designed SIGPLAN-M and CALM to address two gaps in our communities.

Mentorship. SIGPLAN-M provides a mentoring guide,[3] which advises mentors and mentees to focus the first conversation on defining the relationship, and on norms of communication and confidentiality. Communication frequency and medium are among the norms negotiated: a typical commitment is one 30-minute video chat per month, but details vary by match, and some matches communicate only as needed. Both CALM and SIGPLAN-M send check-in email messages every two months to help participants navigate mentoring relationships and address any issues.

Renewal. For both SIGPLAN-M and CALM, the default relationship is one year—long enough to establish common ground, but short enough to provide an easy out. After a year, SIGPLAN-M asks participants if they would like to renew the match, rematch with someone else, or withdraw. It also allows early withdrawal and rematching, if requested.

Mentors and mentees in SIGPLAN-M as of July 2022 (left), and a map of where they live (right).

	Mentees	Mentors
High School Students	3	0
Undergraduate Students	53	0
Masters Students	35	1
Ph.D. Students	135	34
Software Engineers	43	11
Post-Doctoral Researchers	8	24
Government Researchers	0	6
Industrial Researchers	9	36
Industrial Executives	3	5
Teaching Faculty	2	4
Research Faculty	2	5
Pre-Tenure Faculty	12	40
Tenured Faculty	2	59
Other or Unknown	21	9
Total	328	234



Impacts on Our Communities

SIGPLAN-M. As of July 2022, we have 328 mentees and 234 mentors spanning 41 countries (see the accompanying figure). After one year, we ran a survey to gather feedback; a full summary is in the online appendix (see https://doi.acm.org/10.1145/3564287). Among respondents (67 mentees and 51 mentors), satisfaction (1–5) was very high for mentees (median 5, mean 4.43, standard deviation 0.94), and slightly lower for mentors (median 4, mean 4.12, standard deviation 0.89). We observed a gap between how much benefit (1–5) mentees reported (median 5, mean 4.12, standard deviation 1.21), and how much mentors perceived their mentees as benefiting (median 4, mean 3.51, standard deviation 0.85). We responded to this by better communicating mentor impacts. Highly satisfied participants cited common backgrounds or interests, good communication, kindness, and helpful advice; unsatisfied participants cited poor communication.

According to the feedback, SIGPLAN-M has helped mentees without access to local expertise build bridges in the community, and has also had a strong diversity impact. SIGPLAN-M has been particularly successful at pairing transgender mentees with transgender mentors in PL—a need we had not anticipated, but that we are happy to meet. Other outcomes have included help securing Ph.D. positions or jobs, recognizing and leaving unhealthy environments, and forming international connections. While it is still too early to monitor long-term outcomes, we are thankful to our mentors for making such a big difference in mentees' lives already.

CALM. In our pilot, we have paired 21 mentees with 13 mentors across seven countries. Mentees choose from two mentoring "tracks": research and personal development. Most mentee applicants (64.5%) preferred the research track. While the original vision was for these tracks to remain separate, in

practice the track selection was used loosely for forming better matches.

Initial qualitative feedback was largely positive, and like the SIGPLAN-M feedback, demonstrated increased opportunities for students without access to local experts. CALM participants sometimes had difficulty establishing contact with their matches, and expressed concern that more communication is required to educate mentees on how to make the most of a mentorship. CALM is exploring optional communication channels beyond email to address communication gaps, and is reviewing its onboarding process to better educate mentors and mentees.

Challenges We Wish We Had Known

Workload. Running a long-term mentoring program is a *lot* of work. The SIGPLAN-M chair spends approximately five hours per week on this; the CALM co-chairs spend approximately two hours per week each. Community work of this kind—while massively impactful—remains systemically unrewarded at hiring, promotion, and tenure time. This must change.

Challenges: Matching is hard work, and there is a lot of maintenance that follows: check-ins, rematching, renewals, and a never-ending waitlist.

So far: To better motivate volunteers, we have set concrete days for tasks, ensured clear ownership over tasks, and paired committee members to help newcomers learn the ropes.

This year: We plan to set more concrete roles for volunteers. In lieu of concrete roles for tasks like check-ins and renewals, these tasks often fall on the chairs.

Wishes: Work serving our professional communities must be systemically rewarded.

We are extremely grateful for such active engagement from our communities.

Infrastructure. Both programs are still run very manually, which is time consuming, and has led to unexpected challenges such as being marked as spammers by some email clients.

Challenges: We do not want a fully automated matching process, as human attention to matches is important. The infrastructure that we want is nontrivial, and potentially expensive.

So far: We have created email templates, and we have documented manual processes. SIGPLAN-M has one programmer working on infrastructure, but progress has been slow.

This year: We hope to set up simple email automation, and appoint someone familiar with our needs to a dedicated role managing the development of our infrastructure.

Wishes: We need infrastructure for searching and filtering potential matches, managing mentor and mentee profiles, keeping track of matches and capacity, and automating email. The best path could be to pool resources and build common infrastructure. More support from professional societies and buy-in from other research areas would help.

Support. Each of our committees is a handful of volunteers managing tens to hundreds of mentors and mentees. The mentors and mentees could use a lot more support.

Challenges: Mentors tend to overcommit or lose track of communication. Recruiting mentors for specific needs can be hard. Mentors and mentees often need coaching around skills like communication. Mentees are sometimes poor fits for the program, or change interests after starting.

So far: We provide coaching through check-ins. To motivate mentors, SIGPLAN-M acknowledges mentors on our website[4] on an opt-in basis, and highlights exceptional mentors on the SIGPLAN blog.[2,5] When SIGPLAN-M is a bad fit for a mentee, we try to help them find a mentor elsewhere.

This year: We hope to better clarify what makes a mentee a good fit. We also hope to appoint dedicated roles to help with coaching mentors, managing mentor-mentee relationships, motivating and rewarding mentors, and recruiting mentors for specific needs.

Wishes: We want long-term mentoring programs in other communities, so that we can direct mentees toward other programs when appropriate. This will also help with shared dedicated roles across programs, for things that rely little on the details of particular research areas.

more online
To view the online appendix, visit https://doi.acm.org/10.1145/3564287

Going Forward

We are extremely grateful for such active engagement from our communities. We hope to spread our models of long-term mentoring beyond PL and CA, to reach research communities all across computer science. All it takes to get started is a handful of volunteers in your research community willing to put in the work. If this is you, please contact us, and we will joyfully help you get started.

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