Long-Term Mentoring for Computer Science Researchers

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Early in the pandemic, we—leaders in the research areas of programming languages (PL) and computer architecture (CA)—realized that we had a problem: the only way to form *new* lasting connections in the community was to *already have* lasting connections in the community. Both of our academic communities had wonderful short-term mentoring programs to address this problem, but it was clear that 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 Computer Architecture Long-term Mentoring (CALM).

The impacts have been strong: 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 7 countries—it has received very positive feedback. The leaders of SIGPLAN-M and CALM shared our designs, impacts, and challenges along the way. Now, we wish to share those with you. We hope this will kick-start a larger long-term mentoring effort across all of computer science.

1 DESIGNING A LONG-TERM MENTORING PROGRAM

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

(1) 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
(2) helping senior researchers access mentorship of any kind (SIGPLAN-M only).

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* Co-first authors & CALM co-chairs.

◇ Last author & SIGPLAN-M chair.

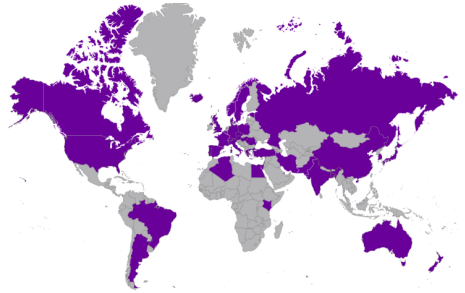|	Mentees	Mentors
High School Students	3	0
Undergraduate Students	53	0
Masters Students	35	1
Ph.D. Students	135	34
Software Engineers	43	11
Post-Doctoral Researchers	8	24
Government Researchers	0	6
Industrial Researchers	9	36
Industrial Executives	3	5
Teaching Faculty	2	4
Research Faculty	2	5
Pre-Tenure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

Fig. 1. Mentors and mentees in SIGPLAN-M as of July 2022 (left), and map of where they live (right).

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 Figure 1 for a current breakdown. It is possible to serve as both a mentee and a mentor at the same time. CALM is similarly global, but is piloting for **students**. The scope 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**. 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 (like mental health). They also include fields for preferred matches and matches to avoid.

Matching. We form matches based on registration data. 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**.

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**. The details vary by match. Both CALM and SIGPLAN-M send **check-in emails** 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. 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.

2   IMPACTS ON OUR COMMUNITIES

SIGPLAN-M. Currently, we have 328 mentees and 234 mentors spanning 41 countries (Figure 1). After one year, we ran a survey to gather feedback; a full summary is in Appendix 4. 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 PhD positions or jobs, recognizing and leaving unhealthy environments, and forming international connections. We are thankful to our mentors for making such a big difference in mentees' lives.

CALM. In our pilot, we have paired 21 mentees with 13 mentors across 7 countries. Mentees choose from two mentoring "tracks": 1) research and 2) 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.

3   CHALLENGES WE WISH WE'D KNOWN

Workload. Running a long-term mentoring program is a *lot* of work. The SIGPLAN-M chair spends about five hours per week on this; the CALM co-chairs spend about 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.

Next 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 needs to be systemically rewarded.

Infrastructure. Both programs are still run very manually, which is time-consuming, and has led to unexpected challenges like 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.

Next 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.

Next 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.

4 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.

REFERENCES

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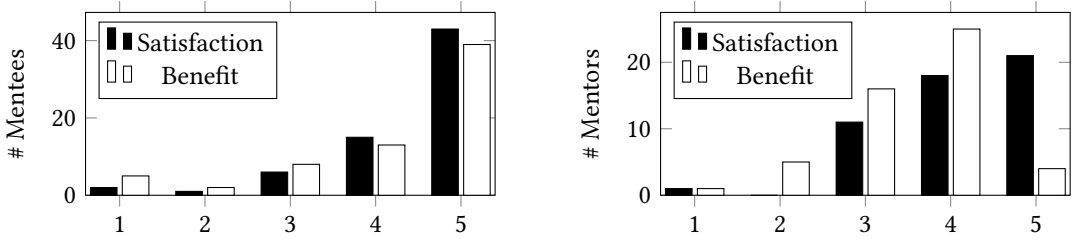
Fig. 2. Quantitative survey results at the end of the first year of SIGPLAN-M, for the 67 mentees (left) and 51 mentors (right) who responded. Both mentors and mentees were asked how satisfied they were with their matches (black bars, scale of 1-5). Mentees were asked how much they benefited, while mentors were asked how much they thought their mentees benefited (white bars, scale of 1-5).

APPENDIX A: SIGPLAN-M SURVEY SUMMARY

Figure 2 summarizes the quantitative results for the SIGPLAN-M survey described in Section 2. In our survey, we also asked mentors and mentees to share anecdotes, which we elaborate on here, with informed consent.

What makes a good match? Highly satisfied mentees often noted that their mentors gave helpful advice, shared common backgrounds or interests, or were kind or good communicators:

> [My] mentor understands me . . . as he comes from the **same country** . . . [he] has picked me from zero knowledge . . . to a point where I know the track ahead.

> She was **very approachable and sweet** and gave me some really **good advice**.

> He **always made time to meet me** when I needed it.

> My mentor is **an expert in the areas I wanted to learn more about** . . . I've been able to [ask] questions about [career and personal topics] along with technical topics.

Highly satisfied mentors noted similar themes:

> My mentee has a **very similar background** . . . which helps immensely.

> One of my mentees is **always in contact with me**, and we are discussing different aspects of PhD based on the mentee's experience, which is so cool.

> We are a good match . . . and have **compatible research interests**.

> My mentee is **very responsive** and **not afraid to ask things from me**.

Consistent with this, both mentors and mentees who were unsatisfied with their matches most commonly cited communication lapses:

> My mentor **never contacted me**.

> We did a few mail exchanges. But **the mentor seemed to drop the ball**. I don't think he was interested in the connection . . . I feel let down as a mentee.

> [My mentor] must be busy and **has not contacted me**, and . . . **I have not been able to gather the courage to contact her myself**.

> [My mentee] **stopped answering emails**.

Of course, as one mentor hinted, it is sometimes hard to know whether poor communication is the *cause* of an unsatisfying match—and it may well be an *effect*:

> I think I was just **unable to connect to my mentees**, so . . . they had no need to follow up (or didn't really like me as a mentor).

Eric Bodden, Sebastian Erdweg, Elba Garza, Sukyoung Ryu, Alexandra Silva, and Talia Ringer°

More investigation into communication lapses would certainly help us improve our program!

What outcomes have we observed? SIGPLAN-M has helped mentees without access to local domain experts build bridges with domain experts in the community:

> [My mentor] also pointed me the directions which I could try, when **my university does not offer related opportunities** to the field which I am interested in.

> I wouldn't be able to **obtain technical feedback** . . . if SIGPLAN-M did not exist.

While we did not ask for consent to share quantitative diversity data, we have anecdotal evidence of strong diversity impacts. For example, transgender mentees have, in many cases, requested transgender mentors to help navigate the challenges of being transgender in our research community:

> I joined the program mostly for help **navigating academia and the job market while trans**, and I feel like I definitely have been getting help in this area!

We had not anticipated this before starting SIGPLAN-M, but it makes sense now—for transgender mentees, it can be outright dangerous to put oneself out there searching for a transgender mentor. SIGPLAN-M allows mentees to request a transgender mentor discreetly.

Other outcomes are described in Section 2, along with a summary of our findings.