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## Retention

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## CHAPTER 6

# Retention

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In the previous chapter, Drs. Vetrica Byrd and Kelly Gaither presented several successful models for engaging a diverse population with the visualization community through various outreach programs. These focused, deliberate efforts are necessary to truly engage and include a population that is not already well-represented within the greater research community. In this chapter we focus on retention - that is, what should a community do once a diverse population engages in order to keep them engaged and more importantly, help them thrive in the community.

### 6.1 MENTORING AND COMMUNITY BUILDING - CRITICAL TOOLS OF RETENTION

Many factors are important for the retention of women and underrepresented minorities in the STEM fields. According to the National Academies of Science, for example, efforts to recruit and retain underrepresented minorities must be urgent, and sustained; comprehensive in addressing the full pathway pipeline; intensive to address inadequate social, educational, and financial support; coordinated across groups and organization; and informed by best practices [121]. An *intensive* effort, in particular, is a focused intervention that seeks to fill in the gaps and level the field for those who have not had the same level of exposure to STEM as others. These gaps may be in financial support, mentoring, social integration, and professional development. Similar recommendations for focused interventions have been made with regards to retaining women in STEM [122]. In this section, we will examine targeted efforts to mentor and integrate underrepresented groups into a research community.

Mentoring is a crucial component of the success of graduate students, post docs, and junior faculty alike, particularly for women and underrepresented minorities. Mentors serve as role models, supporters, advocates, advisers, and more. While the “match” model of assigning a more senior experienced person (e.g. Full Professor) to a less experienced mentee (e.g. Assistant Professor) has historically been employed in many institutions and organizations, a new “network model” has emerged as a popular alternative in recent years ([123]). In this model, 1) the individual mentor is

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replaced or augmented by a network of mentors where each fills a specific mentoring need for the mentee and 2) the mentee is an active participant in creating that mentor network. While the traditional model has merits, some argue that this network model (also known as multiple mentoring) is even more effective in providing multiple targeted sources of accountability as well as resources for collaboration and sponsorship in various aspects of the academic career. Implementing a mentoring policy such as this is typically not the responsibility of a research community, but rather an employer. However, supporting the building and utilization of such networks can be accomplished by a determined research community and can benefit that community in the long run. In the next section, we present two efforts, CHIME and Visbuddies, from two different conferences, that attempt to create the environment in which these kinds of networks can be formed and cultivated in support of graduate students in one case, and in support of newcomers to a research conference in the other.

## 6.2 THE CHI MENTORING (CHIME) WORKSHOP

The Coalition to Diversify Computing (CDC) is a joint organization of the ACM, CRA and IEEE-CS that was founded in 1996 by Dr. Sandra Johnson and Dr. Andy Bernat with the mission of aiding in the building of a diverse community of computing researchers and professionals. The CDC spearheaded several major projects from 1996 to 2016 (when it was dissolved) including the organization of the Richard Tapia Celebration of Diversity in Computing Conference <sup>1</sup>, which still runs today. The CDC also successfully partnered with the CRA to offer many successful discipline-specific mentoring workshops <sup>2</sup> designed to provide mentoring for graduate students in specific research communities.

In 2010, Manuel Pérez Quinñones and Ron Metoyer offered the first discipline-specific mentoring workshop for the Human-Computer Interaction community, co-located with the SIGCHI (CHI) conference in Atlanta, Georgia. This initial workshop was financially sponsored by the Empowering Leadership Alliance, Virginia Tech University, the CDC, and the CRA. The workshop was designed to bring together, in one place, a unique, talented group of underrepresented students doing research in the human-computer interaction field to:

- Help the students build relationships/networks with their peers
- Help students build relationships/networks with leaders in their field
- Provide a welcoming environment for mentoring and collaboration

<sup>1</sup>[www.tapiaconference.org](http://www.tapiaconference.org)

<sup>2</sup><https://cra.org/cra-w/discipline-specific-mentoring-workshops-dsw/>

- Encourage the students' participation in the leading research venue in their field

In short, the goal of CHIME was to help students establish the building blocks of a mentoring network and to support their integration into the broader CHI research community. It provided a unique forum that both highlighted the technical achievements of diverse professionals but also facilitated the mentoring, networking, and honest feedback that is invaluable to graduate students.

Sixty-nine students applied to the 2010 workshop and 40 were invited to attend. The students represented 21 institutions from 14 of the United States and Puerto Rico. In attendance were 24 African American students, 6 Hispanic students, and 10 who identified as Other (Caucasian, Asian-American, Unlisted). Twenty-nine of the forty participants were female. All but three students registered and attended the CHI 2010 conference after the workshop.

The first day of the workshop consisted of two panel presentations and two research topic presentations. The goal of the panels was to provide the students with insights on life in industry and academia as experienced by leaders in their field. Influential leaders including Jim Foley, Mary Czerwinski and Mary Beth Rosson, provided their exciting perspectives on where the field had been, where it was going, and how to prepare their research for future success. These presentations were complemented with short 'research highlight' presentations by several participating faculty members. The day concluded with an off-site dinner and networking opportunity at the STATS restaurant in Atlanta. The second day was filled with technical presentations from both academic and industry researchers on topics including Information Visualization (Jeffrey Heer), Privacy in Social Networks (Heather Lipford), Social Computing (Jason Ellis) and Interactive Information Search and Retrieval (Diane Kelly). These presentations were intended to expose the students to state-of-the-art research in various relevant HCI areas. The day concluded with a poster session and reception where the students presented their work in an informal reception setting and received feedback from peers as well as the participating academic and industry professionals.

The 2010 workshop was a tremendous success and was offered again in 2012 in conjunction with the CHI2012 conference in Austin, Texas. The response was again fantastic. Out of 68 applicants, the workshop was able to support 25 students to attend. In addition, GRAND-NCE<sup>3</sup> funded five additional students from Canadian institutions. All 30 students were enrolled in Ph.D. programs representing 22 institutions in the United States and Canada. Participants included 10 African American, six Hispanic, one Native American, eight Caucasian, three Asian American students as well as three students who identified themselves as "Other". Twenty-two of the 30 total students were female. Five students reported having some form of physical

<sup>3</sup><http://grand-nce.ca/>

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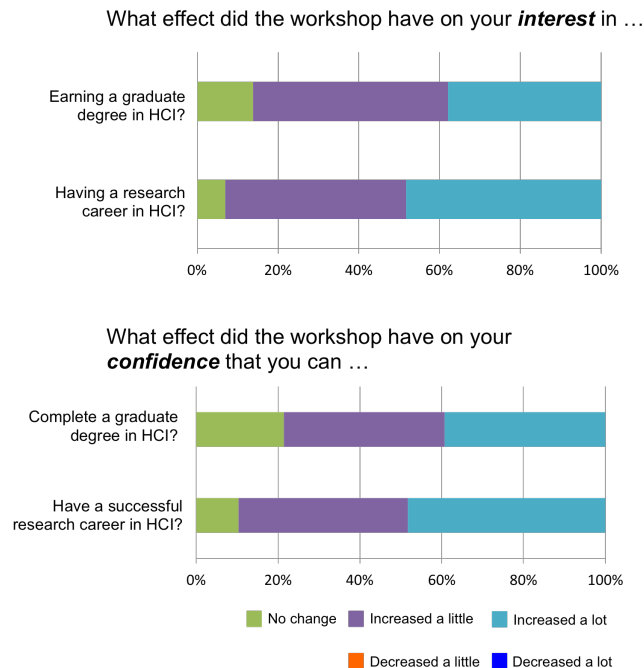
disability (hearing, visual, or mobility) and one student with a severe mobility disability participated remotely from the University of Maryland. All but three students registered and attended the CHI 2012 conference after the workshop.

Based on feedback from 2010, several changes were made to the format of CHIME 2012 to provide more opportunities for students and speakers to network in informal settings and to provide early opportunities for participants to learn of each others' research. In particular, we added two "Fast Forward" sessions for students and speakers and removed the closing poster session. This workshop was also designed to run over one and a half days as opposed to two.

Day one of the 2012 workshop (the half day) consisted of the fast-forward sessions and one panel entitled "Top Challenges/Directions in HCI". In this panel, experts including Ricardo Prada of Google, Juan Gilbert from Clemson University, Tessa Lau of IBM, and Beki Grinter from Georgia Tech, each gave their views on the fields most exciting research challenges and interesting directions for future work. This was followed by a research presentation by Tessa Lau. The day concluded with an off-site dinner and networking opportunity at the Cedar Door restaurant in Austin. Day two consisted of several research presentations by industry and academic researchers including Enid Montague, Yolanda Rankin, Beki Grinter and Cecilia Aragon. Day two also included two panels. The first was entitled "Former Student Panel – Success in a Graduate Program in HCI" and was moderated by CHIME 2010 attendee Sheena Lewis. This panel consisted of several former CHIME attendees and was a closed-door panel (no faculty or industry researchers present) designed to encourage open discussion of the issues faced by students navigating a Ph.D. program. The second panel entitled "Industry, Government, and Academia" consisted of leading researchers from each sector respectively including Cecilia Aragon (U. Washington, LBNL), Enid Montague (U. Wisconsin), Mary Czerwinski (Microsoft Research), John Fernandez (Texas A&M), Ricardo Prada (Google) and Carlos Montesinos (Intel). The second day (and workshop) concluded with a panel entitled "How to Get the Most Out of CHI" and was designed to send the students off to a successful CHI conference with advice from repeat CHI attendees.

### 6.2.1 CHIME RESULTS

A survey of the CHIME2010 participants was conducted by the CRA one week after the workshop. The survey measured increase in participant interest, increase in confidence, and overall experience at the conference, among other factors. The results were overwhelmingly positive. Of particular importance are the impact that the workshop had on participant interest in the HCI area and confidence in their ability to complete a degree and conduct research in HCI. As seen in Figure 6.1, the workshop had a clear positive impact on these self-reported measures.



**Figure 6.1:**

Perhaps even more telling than the findings from the survey data is the informal tracking of the participants of the 2010 and 2012 CHIME workshops. The organizers have informally tracked the original participants and located 57 of the 70 participants. Of these students, 4 are currently Ph.D. candidates, 4 are postdoctoral researchers, 21 are tenure track faculty, 23 are employed in industry or government positions, and 5 are in non-tenure track academic positions (lecturer, research scientist, director, etc.)

The workshop is also showing signs of sustainability. While there was a break after the 2012 offering, in 2018, the authors, along with four previous CHIME participants, ran the third workshop at CHI 2018 in Montreal<sup>4</sup>. The organization and execution has been successfully transitioned to a new generation of researchers and the funding for the workshop is now completely independent of the original CRA/CDC discipline-specific mentoring workshop financial support. CHIME 2018 was the most exciting offering to date with 32 supported participants. CHIME 2018 was offered as a traditional CHI workshop and was well received and well supported by members of the CHI research community.

<sup>4</sup><https://chime2018.wordpress.com/>

### 6.2.2 LESSONS LEARNED

Organizing and running a mentoring workshop such as CHIME is a serious undertaking. After being through the experience twice, the authors have learned several important lessons that will prove valuable to anyone attempting to replicate CHIME in another research community.

First, co-location and cooperation with a major conference is very important. In all three CHIME offerings, the organizers of CHIME enjoyed a wonderful working relationship with the CHI organizing committee and support of the CHI Conference Chairs. While CHIME was not executed as an official conference workshop in 2010 and 2012, CHI provided support in several critical areas. First, CHI provided space at no cost to the workshop organizers. Second, CHI provided administrative support to block register workshop participants for the CHI conference and to make hotel accommodations. The CHI organizing committee also provided an advertisement on the conference site to build awareness in the broader CHI community. In 2018, CHIME enjoyed all of the usual benefits of being a true sanctioned CHI workshop. This co-location and cooperation is a win-win for CHIME and CHI in many ways. First, it increases the diversity of the the Ph.D. students in attendance while the participants get access to the leading venue in their research community. Second, co-location also means that many of the leading researchers will be available to speak to and network with the students during the workshop as well as throughout the conference. Finally, leading community researchers typically attend the CHI conference therefore additional funds are not needed to support travel for the speakers and panelists.

Second, financial support is critical because it provides the pathway for participants to not just attend the workshop, but just as important, to attend the conference that they should be attending as members of the research community. Student advisers, who must cover meals and lodging during the conference, are also incentivised as their funds are supplemented with workshop funds to support their student's travel. While the CRA DSW program provided nominal funds to support the first two workshops, additional fundraising was necessary. We have found industry and government partners quite willing to support these efforts. In fact, CHIME 2018 was completely funded by Microsoft, NSF, SIGChi and SIGACCES.

Third, participation by the broader research community is crucial. The workshop success stems from community leaders' genuine participation in the sessions and interaction with the students. The small workshop setting, before the CHI conference, provides a safe and casual setting for students to interact with researchers who might be otherwise difficult to approach during the main CHI conference. Once the connection has been made, the students are then more likely to continue to interact with these leaders throughout the conference. This serves the obvious purpose



of building the network of peers and mentors for the participants. It also serves to disseminate the student's research work to a broader audience.

Fourth, students benefit greatly from participants from both the majority and minority populations. Organizers should strive to include speakers and panelists from the majority as well as underrepresented populations.

Finally, cohort building is important in that it creates a small group with which each participant can experience the CHI conference. CHI is a large and potentially overwhelming conference. It's also a very social environment and one can easily feel left out of the community if attending alone. The workshop builds a small cohort before the conference even starts, giving the students a built-in social group to experience the conference with and to expand upon.

### 6.2.3 VISME : THE VISUALIZATION MENTORING WORKSHOP

How well does the CHIME model translate to the VIS community? Is a successful VISMe workshop within reach? The authors are of the opinion that there is no real barrier to creating a successful VISMe workshop. While the VIS community is significantly smaller than that of CHI, this means only that the workshop would be smaller in scale as appropriate. The key to success of a VISMe workshop is not in organizing and execution - as the CHIME model provides a blueprint. Rather, the key is in creating an inclusive environment in which participants feel welcome, get excited about the research community, and return from year to year. This can only be achieved by the genuine participation of the broader, inclusive Vis community in the effort. The strategies for building and maintaining that inclusive community are discussed in Chapter 7.

## 6.3 VISBUDDIES

Many conferences organise mentoring programs, aiming to pair newcomers to the conference with experienced attendees. For example, the SuperComputing Mentor-Protégé program that has run since 2008 matches an experienced mentor with a newcomer protégé (usually a student) from similar technical backgrounds; and comes with a set of obligations for both parties, including pre-conference email or phone contact and attending at least one event together. This type of matching can be very rewarding for both participants (as indicated by several testimonials), nevertheless there is a limit to how many protégés can actually participate, as potential mentors have multiple commitments during the conferences and thus the number of protégés volunteering can be larger than that of mentors.

In 2017, IEEEVis community co-chairs Anastasia Bezerianos, Associate Professor at Université Paris-Sud, and Jonathan Woodring, Research Scientist at Los Alamos National Laboratory, put together VisBuddies, a more lightweight commu-



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nity building program. The goal of VisBuddies was to bring together new and returning IEEEVis attendees with similar interests, without the required effort of a full mentoring program.

Instead of pairing two attendees, as it was impossible to get a 1-1 ratio between experienced and new attendees, Visbuddies opted for a small group instead. They created groups of 5-6 people, mixing attendees with different levels of experience. The group size of 5-6 people ensured a small enough group to do activities together (eat, get coffee); and big enough that even if some members could not commit to common activities there would still be a critical mass for the remaining group to enjoy activities together. For newcomers, VisBuddies was a chance to meet experienced researchers in the field and discuss their research and conference experience. For returning attendees, it was a chance to meet fresh talent joining IEEEVis for the first time, both students and young researchers as well as senior researchers and practitioners from other fields attending IEEEVis for the first time.

In 2017, 350 participants (1/3 of the attendees of the VIS conference), volunteered to participate in the initiative through the conference registration form. Their level of experience in attending VIS ranged from 0 to 20 or more years, with the majority (2/3 participants) being considered as newcomers/junior attendees (less than 2 years of attending VIS) and the remaining 1/3 participants considered as experienced/senior attendees (self-reported they have attended the conference for 2 or more years).

### 6.3.1 MATCHING PROCESS AND RESULTS

Participants were matched automatically, through an algorithm that attempted to optimize the consistency of each group such that it included:

- at least two experienced participants (more than 2 years attending VIS),
- participants with common interests, as they were self-reported in the registration process (primary VIS conference and self-reported research keywords reported in the registration form),
- participants holding a mix of positions, in both industry and academia.

The matching produced 60 groups of 5-6 people. The ratio of senior/junior attendees was roughly 2/3 per group (usually 2 senior and 3-4 junior attendees). Each group was contacted in a group email by the community co-chairs, and group members were encouraged to exchange information and meet in person at least once during the conference.

Participants were also encouraged to attend together the “Newcomers Meet-up”, a pre-existing information session that gives newcomers tips about attending the

IEEEVis conference. The community co-chairs co-organised the information session and prepared the room beforehand, placing labels for the different groups to help participants sit together with their group. These groups then went to lunch together. The community chairs were also in attendance to help with group assignment and make adjustments if needed. During the session, three people were alone in representing their group and were asked to join the closest group in terms of number (as group numbers indicate proximity in terms of research topic). People who attended the session without having participated in the VisBuddies program were invited to join the community chairs in forming additional ad-hoc groups (that included the chairs). The presence of the chairs was an essential part of the process to encourage participants, help smooth the transitions to groups, and to ensure that everyone felt included in the process.

The community co-chairs were copied in email exchanges between 28 out of the 60 groups. All of these group exchanges led to plans for the groups to meet during the conference (and members of at least 18 groups met in the Newcomers meet-up information session - 150 people in total). Several groups (at least 15) organised into multiple get-togethers with some of their group members. The majority of the remaining 32 (out of 60) groups very likely met as well, but the community co-chairs were not copied in their email exchanges.

### 6.3.2 OUTCOMES

Overall, this first VisBuddies initiative was clearly of interest to IEEEVis participants given the number of people that volunteered to participate (approximately one third of the conference attendees). The community co-chairs have received informal feedback regarding the success of the initiative. Verbally and through email the chairs have been contacted by both experienced and newcomers to the conference to comment on the usefulness and the potential of the initiative for building a stronger community in the IEEEVis conference. The willingness of participants to meet at least once and for several groups to meet again as a group, indicates the social value for the event.

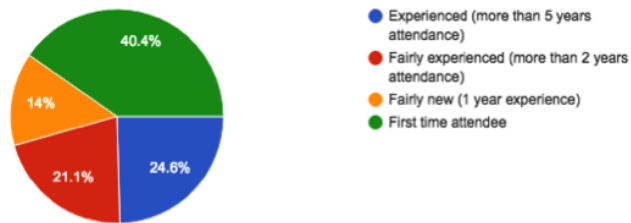
The chairs also reached out to participants with an online questionnaire to collect feedback on the event and gauge their experience and interest in participating in future Visbuddies offerings. The 57 responses received represents roughly 16% of the 350 people that participated in the event<sup>5</sup>. The majority of responses come from junior attendees (see Figure 6.2).

<sup>5</sup>44 of the past 350 participants could not be reached as the email addresses used during the event were no longer valid when the questionnaires were sent out. As several of participants were young professionals this can be explained by changes in their main institution.

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In VIS 2017 were you an experienced or a new attendee?

57 responses



**Figure 6.2:** Experience of participants that responded to the questionnaire.

The goal of the questionnaire was three-fold: to understand what the participants felt they gained from the initiative, to determine if they maintained the connections they made due to the initiative, and to find ways to improve it.

**Meetings:** Participants were first asked if they did indeed meet their buddies, and if this only happened in the meetup. At least 55.6% (30 participants out of 57) of participants who responded actually met in the Newcomers meetup, indicating that having a dedicated venue aids with the logistics of meeting buddies. Another 44.4% (24 participants) mentioned that they met with their buddies more than once in the conference, indicating the matching can lead to connections that go beyond the structured event (Newcomers meetup) recommended by the initiative. The remaining participants either could not attend any meetings organized by their buddies (5.6% - 3 participants) or did not organize to meet with their buddies (13% - 7 participants). Although the questionnaire sample is small (16% of the initial responded to the questionnaire) and likely biased towards participants who enjoyed the event, the responses indicate a confirmation that participants made an effort to meet with their buddies (providing further evidences to our own observations of email exchanges).

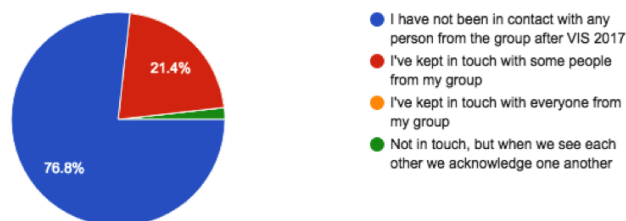
**Newcomers meetup:** The vast majority of people responding to the questionnaire felt that the main value of the Newcomers meetup was as a means to meet their buddies (49.1% - 28 out of 57 participants), although some still felt the event helped them find out more about the IEEEVis conference in general (21.1% - 12 participants). Another 22.8% (13 participants) indicated that they could not attend the meetup because they had other engagements during that time - we note that several

of these participants met with their buddies outside the meetup (given the overall numbers of people who met with their buddies). Finally, 10.5% (6 participants) did not find the event useful. Overall, these findings support that having a dedicated event to help people meet in person is important for most participants, but it is good to pair it with secondary objectives (e.g., advice for newcomers to the conference).

**Further contact:** Although less than a year has passed since the event ran, we were curious to see if participants kept in touch with their buddies after the conference. We were delighted to find that 21.4% (12 participants) actually kept in touch with some people from their group (a further 1.8% ,1 participant, said they acknowledge each other when they meet). The remaining 76.8% (43 participants) have not had any contact with their buddies since. Results can be seen in Figure 6.3. We also asked participants if they plan to meet any of their buddies in the upcoming VIS 2018 conference. The majority (42.6% - 23 participants) stated that if the opportunity arises (see each other) they would be open to it. Another 1.8% (1 participant) had already made plans to meet with their buddies. The rest (29.6% - 16 participants) said they have not considered it (and a further 24.1% - 13 participants are not attending). Results can be seen in Figure 6.4. Combined, these results indicate that although in some cases the initiative helped make connections that went beyond the IEEEVis 2017 conference, forming lasting relationships takes time and requires several occasions where people can interact. One potential solution is to offer lightweight initiatives to help people keep in touch, such as sponsored alumni lunches or ways to communicate when former buddies are attending conferences.

Did you keep in touch with your VisBuddies after VIS 2017?

56 responses



**Figure 6.3:** Contact after VIS

**Matching success & benefits:** On a likert scale, participants indicated whether they felt the matching of the initiative was successful as well as to which benefits they felt

If you are attending VIS 2018, are you planning to meet with any of your 2017 VisBuddies?

54 responses

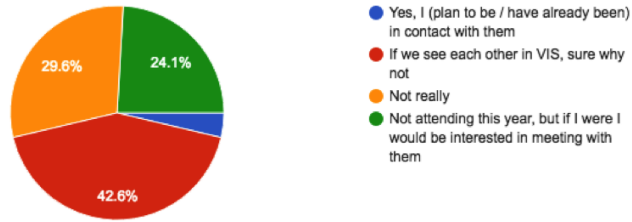


Figure 6.4: Plans to meet with previous VisBuddies at upcoming VIS

the initiative brought them (remaining items in Figure 6.5). As the responses indicate most participants felt the matching was fairly successful in bringing together people with similar research interests and different experiences. When it comes to the benefits there does not seem to be one single benefit that stands out (apart maybe the fact that for many participants it made their attendance experience more enjoyable). The other reasons (e.g., meet peers, meet more experienced researchers, form connections) seem to resonate for a subset of the participants.

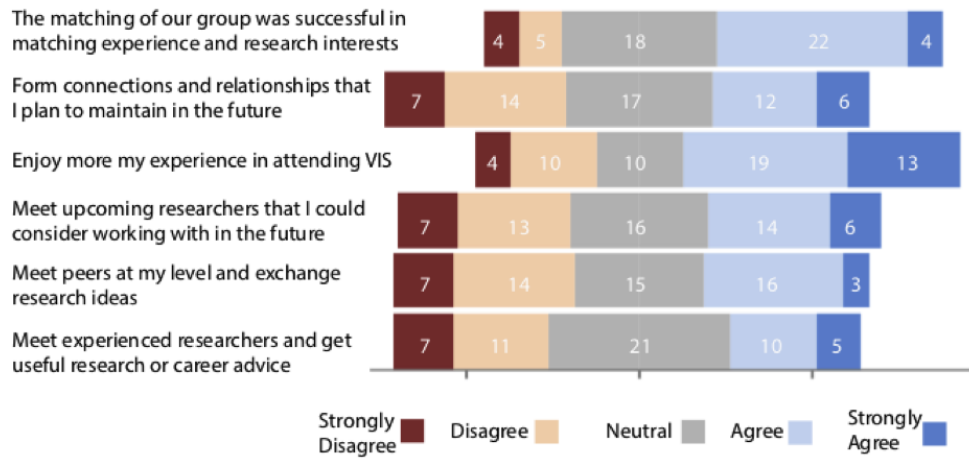


Figure 6.5: Success of the matching algorithm and effects of the Visbuddies experience

**Joining again:** When asked if they will participate in the initiative in following years, 25.4% (14 participants) responded they would definitely attend again and 40% (22 participants) that they are considering it. On the other hand 7.3% (4 participants) responded that they did not find it useful and thus would not attend again. A further 25.4% (14 participants) stated they would not attend the conference.

**Other feedback:** Free form comments from questionnaire participants indicated that one aspect that could be improved would be to somehow ensure the commitment of more senior people (who could not always join the groups), and to adjust what is considered as "senior" to not include students (in our matching definition we considered as senior anyone with more than 2 years experience). Getting senior people to commit to meeting with juniors and participating in the event is a true challenge given their time constraints and general overloaded schedules.

### 6.3.3 FUTURE DIRECTIONS

Although the VisBuddies program seems to have been appreciated by participants there are clearly several aspects that could be improved. First, some participants were surprised they were labeled as senior/experienced in their group, and others were disappointed by the lack of truly senior people in their group. The setup of the automatic matching algorithm frequently resulted in senior people that were older PhD students with multiple years in the field, mainly due to the number of participating attendees with extensive professional experience (e.g., professors) being small. While considering alternative thresholds for distinguishing experience/seniority is important, there is still potential value in senior students serving as mentors given their availability as compared to the non-student senior members of the community.

Nevertheless, ensuring the involvement of more senior researchers and practitioners in the field is clearly needed. This is an important challenge given that conferences are opportunities for seniors to meet with colleagues, resulting in very busy schedules. It is crucial that the community as a whole appreciates the need for (and benefits that come from) mentoring newcomers in the field.

Although several email exchanges between group participants showed that participants were planning to attend similar research sessions (indicating their interests were aligned), other aspects of the matching algorithm can still be improved. In particular, data collected from the participants is being analyzed to determine other aspects/properties that could be included to improve the matching.

It seems the Newcomers meet-up session was not attended by almost half of the participating attendees based on the email exchanges. The reason for this is currently being investigated. Even though the questionnaire did not reveal a specific reason, primary feedback indicates this may have been an issue with the timing of the session

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(it took place before the main conference started). Nevertheless, it is possible that several groups prefer the freedom of meeting outside a prearranged event.

### 6.3.4 DIVERSITY AND INCLUSION

How can Visbuddies be used to foster diversity and inclusion at IEEEVis? As noted earlier in the chapter, mentoring is a critical component of inclusion and thus retention. While not designed as a purely mentoring initiative, Visbuddies clearly includes key elements of mentoring including the ability of newcomers to network and meet experiences attendees as well as the opportunity to learn from experienced attendees how to get the most out of the vis conference. Ensuring that participants from underrepresented populations are distributed across matched groups is one way to begin to promote diversity. An potentially more effective option could be to match senior members of IEEEVis with junior members of underrepresented populations together, to help juniors gain targeted mentoring. These two are somewhat competing goals from an algorithmic perspective given that the number of senior and junior attendees from underrepresented groups is low. To truly help promote both inclusivity and diversity one could consider branching into both, a more targeted mentoring program for juniors in the field, and a more social initiative to help attendees meet other people in the same field. VisBuddies currently sits in the middle of these two goals. In both cases, one of the biggest challenges is to engage and convince senior participants to contribute to the process, as they remain a key aspect of any mentoring and networking effort. Existing events (such as panels on diversity and inclusivity) can act as safe places to communicate to both seniors and juniors about the needs of our community and to promote mentoring events.