At BOSC, Community Discusses Ways to Boost Diversity, Participation in Bioinformatics

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DUBLIN (GenomeWeb) – A panel discussion at this year's Bioinformatics Open Source Conference, one of the special interest group (SIG) meetings held prior to the start of the Intelligent Systems for Molecular Biology conference here, sought to find mechanisms and approaches that the community could adopt to increase and encourage diversity in all its forms including in terms of academic backgrounds and subject matter, gender, ethnicity, and geographical location.

The open forum covered practical ways that principal investigators could diversify the faces in their labs; how existing members of the community could become involved in activities; and how the field might attract researchers with backgrounds outside of the computational space.

It also highlighted existing resources such as gender-specific workshops that have been set up to create conducive atmospheres for learning new skills. The intent was to start a conversation, Mónica Muñoz-Torres, lead biocurator at Berkeley Bioinformatics Open-Source Projects and moderator for the panel, said during the discussion, one that would hopefully result in concrete changes within the community.

The diversity discussion actually began during one of the BOSC Birds of a Feather sessions — small groups of like-minded individuals discussing issues of interest to them — held during last year's meeting in Boston. BOSC has always worked to be inclusive — it has had female co-chairs for many years — but it has really stepped up its efforts in the last year.

Nomi Harris, one of the meeting's co-chairs, said at the start of this year's meeting that efforts so far have included reaching out to organizations formed to support underrepresented groups in the community. The group also successfully lobbied the International Society for Computational Biology to adopt a code of conduct earlier this year that provides guidelines for self-conduct at ISCB conferences, SIGs, and satellite meetings. It has also hired a volunteer outreach and diversity coordinator to engage with the community and encourage active participation in its activities. Other changes made in the last year include using more inclusive and welcoming language on the BOSC site, as well as lowering the financial costs of conference attendance by offering free registration to some accepted speakers, Harris said.

In addition to the panel, this year's meeting also featured smaller changes aimed at boosting participation. This included giving attendees that the option to ask questions anonymously by writing them on note cards or tweeting them to BOSC, a measure intended, at least in part, to make it less intimidating for individuals averse to standing up and asking questions publicly. This actually proved to be a successful tactic, Harris told GenomeWeb following the meeting, noting that most of the questions that came through these new outlets came from women.

To its credit, the software community has worked quite hard to create environments that support learning. Aleksandra Pawlik, a training lead at the Software Sustainability Institute at Manchester University and one of the panelists, highlighted software training workshops specifically for women. As a member of the steering committees for Data Carpentry and Software Carpentry Foundation, she helps organize and teach workshops and training sessions that offer the same content as coed classes, in an atmosphere that is perhaps more comfortable for women, particularly those new to the field, and could give them the confidence to make the leap to co-ed classes. This is a bit of a double-edged sword, noted by at least one attendee, since separate workshops may have the unfortunate side effect of reinforcing existing gender stereotypes which the community is trying to distance itself from. But on the plus side, gender-specific workshops offer solid networking opportunities and a chance to meet and connect with other women, in this case, that share similar interests and research focuses, another attendee pointed out

But there is always room for improvement. For instance, the BOSC community could provide more encouragement to young people to pursue training in the sciences by providing mentorship and opportunities for students to get their feet wet, Jason Williams, lead of the iPlant Collaborative's Education, Outreach, Training group at Cold Spring Harbor Laboratory, and one of the BOSC panelists, noted during the discussion.

He is part of a number of efforts that seek to reach underrepresented groups with opportunities to explore the life sciences. In his position at CSHL, for example, Williams is involved in efforts to reach students at the undergraduate level and younger. He is also a lead instructor of "The Science Institute" at Yeshiva University High School for Girls, and volunteers on the steering committee of the Software Carpentry foundation.

Specifically, Williams told GenomeWeb, educational outreach and training efforts offered under the auspices of the iPlant initiative include making relevant educational resources and training as well as compute resources accessible and available to faculty and students at universities and institutions including those that serve underrepresented minorities. One of those resources is DNA Subway, a web application modeled after rail transit systems that's designed tohelp biology teachers introduce their students to basic concepts of bioinformatics analyses.

Williams is also involved with CSHL's DNA learning center, which offers opportunities for middle school and high school students to learn about the life sciences, including setting up laboratory spaces across the New York area where students can get hands on experience in genomics and biology. On one hand, these programs help to introduce students to basic genomics concepts which will hopefully broaden participation in the field, especially from minorities, he said. In addition, tools like DNA Subway, which provide access to actual bioinformatics analysis workflows, serve as a gentle introductions to the more complex bioinformatics tools and applications that students will be required to use if they pursue careers in research. They also equip faculty with resources and skills to train students in genomics and genetics.

Panelists also stressed the importance of crafting clear messages about the nature of the bioinformatics domain, and about career prospects and opportunities, particularly when reaching out to the younger generation. It's important to show young people how getting involved in STEM subjects like bioinformatics can form the basis of viable and rewarding careers, Williams noted

during the panel. "Open source doesn't necessarily ring money in people's ears," he said. And that can push underrepresented students towards more traditionally lucrative and simpler-to-explain careers such as medicine. "One of the ways that's very valuable is to show those who you are mentoring and working with how [this could] be a component of a career path … and allow them to be successful independent people."

Context is also important. When Muñoz-Torres, who is involved in the Southeastern Chapter of the Society for Advancement of Hispanics/Chicanos and Native Americans in Science, meets with undergraduate students, she tries to talk about genomics in a manner that makes sense in the context of their backgrounds. So for computer science students, for example, "I try to present the genome as an actual operating system," while she might use a different analogy to describe the genome to biology students, she told GenomeWeb.

Muñoz-Torres also volunteers her time to organize high school science fairs and provide morale support for students. "I share Jason's view that [introduction to the sciences] definitely needs to happen at an earlier level," she said. However, interest in the computational sciences is now far more pervasive that it has been in previous generations. "Kids who are just starting in the biological sciences know a bit more about the computational aspects [and] the computational tools that are available … that are going to be beneficial to their career."

Increasing diversity isn't just about reaching new groups of people. The community also needs to look into incorporating diverse workflows and research interests, Holly Bik, a fellow and assistant professor in the School of Biosciences at the University of Birmingham and one of the panelists, said during the panel.

Bik, who gave a keynote at this year's BOSC, is an example of this. She is a biologist by training who over the last five years has learned and now develops and routinely uses computational tools in her projects. She is currently working on Phinch, an open source framework for visualizing biological data. Using her field as an example, Bik noted that genomics and computational tools are useful supplements to traditional methods of studying marine microorganisms, but that's not necessarily something that an individual going into the field might be exposed to initially. "I think there is a lot of opportunity especially in this world to have people excited about biology … get trained in these other skills which are more transferable in the real world."

For current members who feel left on the sidelines, a practical way to feel more included is simply to volunteer to organize and plan activities and events. As Bik and many others in the community have noted, scientific committees do have a tendency to be largely male-dominated. Furthermore, they are often populated mostly by scientists much further along in their careers, Bik said during the panel. There certainly are opportunities there for women and younger scientists to take on more active roles in communities of interest to them, she said.

In a related vein, community members could be more proactive about identifying and encouraging fellow colleagues and students who exhibit certain skills and abilities to step into leadership and

mentorship roles, and to support and encourage those who are already serve in these roles, Williams added.

Meanwhile, PIs seeking to increase diversity in their labs could consider adjusting the language they use to word opportunities in their labs — clarifying preferred versus necessary requirements — to encourage a more diverse pool of applicants to apply for positions, panelist Michael Crusoe, the lead for the k-h-mer software project at Titus Brown's laboratory at the University of California, Davis, said during the discussion. They could also try direct outreach to groups that work with underrepresented groups or ask for student recommendations from colleagues to help boost in-lab diversity. Another possibly effective approach PIs could adopt would be to ask applicants who elected to go to other labs about the reasons for their decision, he said.

Bik also suggested offering paid research opportunities to undergraduate students giving them an opportunity to engage in interesting research projects and potentially setting them on the path to graduate study. Another option might be for two labs to share a postdoctoral student, for example, with another lab, she said. In some settings this has helped to encourage some female scientists who may not be comfortable working exclusively in male-dominated labs to step outside their comfort zones. It's also a way to encourage the sort of interdisciplinary activity and cross-pollination across the sciences that BOSC seeks to boost, Bik said. A female biology postdoc, for example, could split her time between her "home" biology and a strictly computational lab where she could pick up computational skills that would be beneficial in current and future research projects. Other practical suggestions from the discussion included offering — and explicitly stating in job applications — more flexible working hours that allow researchers time away from work. Researchers could also get involved by participating in discussions on various online forums.

Panelists who spoke to GenomeWeb after the meeting hoped that the enthusiasm generated by the discussion would not falter following the close of the panel. "I think there is room for improvement," Munoz-Torres said. "The panel was the beginning of a conversation that needs to carry on. I hope that all the faculty in the room feel inspired to go and make changes in their labs and that those that are in more junior positions and perhaps a little more shy about becoming involved actually step up … as role models for those that are starting on the path of the sciences and bioinformatics and open source."

In his comments, Williams stressed the importance of better communication with students to help clear up confusion on what open source entails, and to discuss transferable skills they can acquire and career prospects. "It's a very high and noble principle to be open source … but we have to show how practical it is," he said. That's also true more generally for researchers seeking to communicate more effectively with people outside the domain, such as biologists who may be unfamiliar with bioinformatics concepts and tools, he noted.

Furthermore, the community needs to invest time and resources in the next generation of researchers focusing not just at the undergraduate level but lower. The simple truth is that the pipeline of fresh minds and perspectives — particularly in terms of minority groups — is still small, Williams said, and so efforts to be more inclusive may not have the sort of far-reaching effects that one might hope. "We need to focus on the lower level and get those students and their teachers, especially, up to speed."

BOSC's organizers have already begun mulling practical ways to boost participation in the community over the next year. "We would like to find more ways to reach underrepresented people and hopefully encourage them to submit abstracts to BOSC — or at least to attend," Harris told GenomeWeb. "We did some of that this year but we want to broaden that outreach," she said. "The whole community can help us with that effort, by spreading the word about BOSC to groups and individuals."

Other ideas include possibly offering financial assistance in the form of travel subsidies to potential attendees with limited resources. "We already gave free registration to some speakers, but we might be able to, for example, offer to pay for childcare at the conference for attendees to whom that would present a barrier to attending," she said.