

## A4RC Faculty Report

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### 1 Summary

Based on surveys and interviews, we are confident that A4RC has a positive influence on students, faculty, and departments and that it can be sustainable. The report is divided according to the goals stated in the original A4RC proposal and we provide below the recommendations derived from this evaluation report:

- Despite the fact that departments are aware of the A4RC project, **there is a need to get more faculty members involved.** This could take place by formally inviting faculty to A4RC meetings, sharing about the successes of A4RC in meetings and informal conversations, bringing A4RC activities that include the research interests of all faculty in the department such as symposia, renown guest speakers, workshops, discussions of potential partnerships, etc..
- **Make faculty feel needed in partnerships;** not only for departmental or program success, but also by showing how faculty can benefit by bringing in their own ideas and potential partners into the A4RC project.
- **Make more efforts to recruit graduate students into pods.** Undergraduate students rely on these role models and have shown great appreciation for their role; it will be very helpful for undergraduate students to participate in small pods with at least one master's and one Ph.D. student.
- **Continue to emphasize the importance of graduate education to undergraduate students and the importance of the Ph.D. degree to master's students.** Along with the importance of these degrees, emphasis must continue to be placed in the opportunities that such degrees open to students and the linkage between academic success and professional success—in academic research (or professoriate) as well as in research-driven industry.
- **Continue to seek faculty-faculty partnerships that are initiated by faculty and founded on their collaborative research interests.**
- **Engage in creating pathways to R1s.** While some faculty members are already engaged in creating pathways, there is a need for faculty to create clear and comprehensive pathways for students to enter R1s. These might also be contingent on faculty-faculty partnerships.
- **Publicize available funding opportunities among students** (undergraduate and master's), during their early stages in the program. Funding is a catalyst for student retention and interest in graduate student.
- **Develop mentoring relationships with students.** The data suggests that more work needs to be done in regards to building connectedness between faculty, particularly adviser, and students. In particular, we recommend that the master's students be made

aware of what pods are doing and we recommend finding ways of connecting them with R1 research during the summer. **This is both the responsibility of advisors and faculty.**

- **Develop mentoring relationships with industry leaders** that allow students to see real-life applications of potential research topics. Faculty should be encouraged to participate in Mentornet.
- **Take advantage of existing partnerships with other BPC alliances (Empowering Leadership Alliances) and plan for existing remedies for potential isolation in white-majority institutions.** This alliance will furnish students at majority institutions with mentors, fund and promote travel to conferences (e.g., Tapia, Hopper), and bring students into a larger national community of underrepresented students in computing.

## 2 Brief Overview

We conducted surveys and interviews with faculty to determine their perspective of the impact of A4RC on departments, faculty, and students; and, to determine the degree to which the project is sustainable. Seven faculty members from Indiana University, Georgia Tech, Jackson State University, Norfolk State University, North Carolina A&T, University of Colorado, and Virginia Tech responded to the survey and nine faculty of which six were from HBCUs and three from R1s participated in the interviews. A goal of the evaluation of the alliance is to provide ongoing feedback to improve implementation and permit customization according to specific campus' needs. This report is formative rather than summative.<sup>1</sup>

Table 1 (see Appendix) shows that 57 percent of the surveyed faculty reported that their institution had at least two faculty members involved in the A4RC project; Table 2 (see Appendix) shows that at least two faculty members received funding through A4RC; one respondent explained that among these faculty, one has received salary and two have received travel funding. Most of the faculty we interviewed agreed that, despite the fact that their colleagues are aware of the A4RC project, there is need to get more faculty involved.

## 3 Goal 1: Increase quantity and quality of African-American students awarded advanced computing degrees by strengthening computing programs at HBCUs

**Description of Goal:** Recruit undergraduate and master's students into majority institutions' graduate programs using research collaborations. Academic year "research pods" are led by collaboration of HBCU and majority institution faculty; each pod includes faculty, graduate students (1-2), and several HBCU undergraduates. Along with the research pod is a research course taken by graduate and undergraduate students (video stream from Virginia Tech). Undergraduates then attend a summer research experience at the majority faculty member's home institution.

### 3.1 Student Involvement in A4RC

The majority (40%) of the surveyed faculty reported that their institution had four undergraduate students involved in A4RC; 20 percent reported that 12 undergraduates were involved; and, another 20 percent reported that five undergraduates were involved. In regards to Masters, 40 percent reported one masters' student, 20 percent seven masters' students, and another 20 percent reported three. 50 percent of the faculty reported that their institution had three Ph.D. students involved, while the other 50 percent reported that only one was involved.

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<sup>1</sup> Formative evaluation (implementation based) is intended to strengthen project planning and implementation through collection, analysis, and reporting of data to inform project planning and decisions and consultation on research and evaluation studies of projects with similar goals and audiences. Summative evaluation (outcome based) is intended to track progress of the project.

In regards to the number of undergraduates in pods, 50 percent of the faculty reported that their institution had seven seniors; 50 percent had three juniors and another 50 percent had two juniors; 33 percent reported four sophomore, 33 percent reported two, and 33 percent reported one; and, 50 percent reported one freshman. (See Appendix, Table 4)

Pertaining to undergraduates' interest in participating in a research experience at R1 partner institution in summer 2009, 20 percent of the faculty reported that 12 students were interested in participating; 20 percent reported that five were interested; 20 percent reported that four were interested; and, another 20 percent reported that three were interested. Among the graduate population, 33 percent of the faculty reported that six were interested; and, 33 percent reported that three were interested. (See Appendix, Table 5)

### **3.2 Student Interest in Graduate School**

We found inconsistency between what the survey results show and the data collected from the interviews. Interviews shows an overwhelming student interest to attend graduate school, yet faculty estimates (in the survey) of the difference in student interest in graduate school resulting from A4RC presence on campus suggest there was a higher interest in graduate school prior to A4RC. This inconsistency may be a result of misunderstanding of the survey question since supporting evidence from the undergraduate surveys (summer 2008 and spring 2009) and from faculty interviews shows that A4RC had a positive impact on undergraduate interest to pursue graduate degrees. For instance, one faculty member claimed that, in his program, the biggest impact was on undergraduates in that all showed interest in pursuing graduate school; this, the faculty member pointed out, more than doubled graduate enrollment—from 20 to 42 students in a year—and there are now 45 students, of which over 40 have applied to graduate school.

Despite the contradiction, we present herein the results from the survey. Table 9 (See Appendix) shows that 75 percent of the faculty estimated that, in the past, at least 11 undergraduate students applied to master's programs and 75 percent estimated that at least six were admitted to master's programs; in contrast, 25 percent estimated that more than 15 undergraduate students applied and 25 percent estimated that more than 15 were admitted to master's program, as a result of A4RC; 25 percent of the faculty estimated that, in the past, more than 15 undergraduate students applied to Ph.D. programs and 25 percent estimated that more than 15 students were admitted in Ph.D. programs; in contrast, no faculty estimated a number of undergraduate students who applied or were admitted to Ph.D. programs as a result of A4RC; 25 percent of the faculty estimated that, in the past, at least one master's student applied to a Ph.D. program and 25 percent estimated that at least one student was admitted to a Ph.D. program; in contrast, 25 percent estimated that at least one master's student applied and 25 percent estimated that at least one was admitted to Ph.D. program, as a result of A4RC.

### PATHWAYS TO R1

- I feel confident about creating pathways to R1
- Getting on the students' radar early is very important
- Plant in their head that they can do this (for a few years during their undergraduate)
- Organize multiple visits to R1s
- Get students to spend some (e.g., 8-10) weeks at the school
- Finding something that's really of value to the R1s is what we struggle with

Interviewed faculty stated the following about interest in pursuing a Ph.D. and pathways to R1s:

- Students' participation in internships may be a catalyst for their opting to attend graduate school instead of going to industry right away.
- Part of the path is getting undergrads excited about research in computing, especially with the job market. Even if you get them excited and don't have R1 institutions that are interested in them and willing to support them.
- HBCU does not have a Ph.D. program, so it's beneficial for both parties.
- Having a good example. We have one student from NSU who got a NSF fellowship; she can go to NSU and talk about her experience.
- There are some things to take into serious consideration:
  - How to facilitate the transition to the Ph.D.
  - How to deal with cultural concerns and the other things that make people anxious—establish collaboration early on because pods work better when students know as much as possible about the environment (e.g., the people, the institutional culture, the research, etc) they are going to work in. This also includes race- and gender-bound anxieties.
  - How to overcome ignorance. There are a lot more people in the world of HBCUs that know the world of R1s than the reverse.
- Faculty-faculty interaction and partnerships built around pods are an effective avenue to create pathways to R1s.

### 3.3 Pod Selection Process and Students' Funding

One of the faculty members we interviewed reported that students were selected, purposefully, over the summer and were informed via e-mail about the opportunity to participate in A4RC, but many students are still unaware although word-of-mouth is beginning to generate some results and they now claim five undergraduates and two undergraduates. The faculty member also noted that taking these students to a conference is a great factor in making the project known since students get very excited about attending conferences and tend to share their experience with others who did not attend. Therefore, it is essential that funding continues to be made available—and is increased—for attending conferences. Another faculty stated that their college of science and engineering technology has a large honors program where students are fully funded. They did not pick those students, but looked at students who were sophomore or rising juniors, looked at GPAs and tried to form opinions about them. They were able to select five students.

Table 6 shows that 40 percent of the faculty estimated that their pod met more than once a week outside of class, 20 percent estimated meeting once a week, and the remaining 40 percent estimated once a month. Table 7 shows that 17 percent of the faculty estimated that their pod subgroups met more than once a week and 17 percent estimated meeting twice a week.

Seventy five percent of undergraduate students received funding from A4RC and 25 percent from both A4RC and other source. Twenty five percent of masters' students received funding from A4RC and 75 percent received funding from both A4RC and other source. Faculty reported that all Ph.D. students received funding from other funding source, i.e., no A4RC funding went for Ph.D. students. (See Appendix, Table 3). One of the interviewed faculty members claimed that with enough financial support, more students can focus on A4RC; particularly, if such financial support came through participation in internships.

<b>Pod Selection Process</b>
<ul style="list-style-type: none"> <li>• During the first year, e-mail was sent out. During the second year, students that were interested in doing research were added to pods. Students participating in pods from other funding sources were selected by their advisors.</li> <li>• Students interested in the program were asked to submit a resume and transcript. Each student was then interviewed for a position.</li> <li>• Personal Invitation based on student achievement (non-DNIMAS students with A/B grade in CS courses). DNIMAS is a full scholarship negating the need for extra funding).</li> <li>• Students of the faculty pod advisor</li> </ul>
<b>Past Student Funding Source</b>
<ul style="list-style-type: none"> <li>• The Biometric (HPC) pod is combined with students from the Center for Academic Studies in Identity Sciences that is being funded by the Army Research Laboratory.</li> <li>• Some graduate students were funded by the Computer Science Department</li> </ul>
<b>Funding Available for Student Involvement in 2009 Summer REUs</b>
<ul style="list-style-type: none"> <li>• Just the A4RC funding.</li> <li>• Regular funding</li> <li>• We have it covered through A4RC and REU supplements</li> <li>• I am applying for 3 REU slots</li> <li>• We are expecting the R1 institution to fund the REUs. I am unaware of where that funding will originate.</li> <li>• hard to say, seems dependent on what we get from REU supplements</li> <li>• GT will provide travel and stipend money and A4RC will cover room, board and fees for the summer.- for 4 students</li> <li>• IU STEM \$\$ will fund the 3 MS students for summer research with Raquel Hill. A4RC will cover their travel expenses. The 4 undergrads coming here will be funded solely by A4RC.</li> <li>• Ph.D. student will work with pod this summer and will be funded from other research</li> </ul>

money

#### **4 Goal 2: Institutionalize two-way research and graduate education and teaching partnerships through research collaboration and curriculum outreach.**

**Description of Goal:** Develop and institutionalize two-way research, graduate education, and teaching partnerships. This is expected to provide research experiences, role models, and visibility of research careers for undergraduate and master's students in HBCUs.

##### **4.1 Departmental Support and A4RC Presence**

Most of the HBCU faculty we interviewed reported that their colleagues in the department are aware of A4RC and that their colleagues and chairs are, to some extent, supportive, i.e., some actively supportive yet others are only passively supportive; however, most find it hard to get people involved for a variety of reasons. Some faculty members are interested in participating, but already have other commitments that hinder their participation in the project. Often, this group of faculty offers moral support by simply asking how the project is progressing.

One of the respondents shared that while there is an expectation for A4RC to be an influence in the institution, it does not have much influence, perhaps due to the weak start (“first year was a mess,” as the respondents puts it), but believes that it is improving and people are getting to know about A4RC despite a lot of competition from grants, accreditation requirements, and other projects and tasks. Another respondent shared that, in their institution, A4RC had a very good beginning and they were able to invite a lot of speakers, encourage a lot of interdisciplinary and cross-institutional collaborations, and to steer a lot of excitement. However, limited funding became their biggest challenge and, contingent on availability of funding, the goal is to fund also the aspects of project that were not funded thus far. Nonetheless, the latter claim a success story for an institution with limited funding and with most graduate students working full-time jobs. A respondent showed preference for getting students to go to another (preferably R1) institution.

Overall, the HBCU faculty interviewed share a great sense of hope in the future of A4RC, yet share concern for funding as one of the foundations to motivate participation and sustain the program in the school; since in most of their faculty are overworked—adding A4RC to their load is viable if they, at least, do not have to worry about funding.

R1s Faculty interviewed shared that several faculty in their departments know about A4RC, but more needs to be done to advertise it and to motivate faculty to participate. One respondent claimed that their faculty show interest in concerns of minority involvement such as those addressed by A4RC, are involved in (or at least are aware of) multiple BPC projects, and are trying to leverage and to learn from these multiple projects.

## 4.2 Curriculum and Pedagogy

In regards to the influence of A4RC on pedagogy and curriculum, a respondent claimed that “as a result of this alliance faculty members trained in effective practices that they would not have otherwise have done.” Another respondent shared that videos were developed from a research course that was offered by a team (partnership) of professors and another professor assigned a paired programming lab-based project and administered a survey on the paired programming.

All faculty agreed that research methods courses/modules are helpful for undergraduates to understand the nature of, and steps involved in, research; all faculty agreed that it is helpful for graduate students to understand the nature of, and the steps involved in, research; 80 percent of the faculty agreed that it is helpful for them, as faculty mentor/advisor, to structure projects for students and to determine how much they know about research; and, 20 percent agreed that it is helpful for graduate students to structure projects for themselves. (See Appendix, Table 8)

One faculty shared that while students join pods for a variety of reasons (e.g., working on robots, software development, programming, etc.), their engagement in the research course and the pod helps them to eventually learn that research is essential for their pursuit. As the respondent puts it, “They (faculty involved in A4RC project) try to push that down their (students) throats.”

## 4.3 Characteristics of Pod Meetings

- Assign research topics to students, read articles, and give them specific research assignments to complete; I use a step-by-step approach.
- Have each of the grads and undergrads involved in some aspect of the research.
- By the end of the semester they have a 15 pager, which they can use for part of a paper.
- The structure is especially useful for undergraduates—helps them put other things aside and focus on project, gives them a better structure, and, when they’re more mature, they will tend not to need that structure.
- Each person in the pod has something specific they need to do.
- When they come in they know what to expect.
- Set realistic expectations both for (all) faculty and (all) students.

According to the interviews with faculty, meetings range from daily meetings to summer-only meetings. Pod meetings are characterized as follows:

- Daily meeting. If students have questions, they stop by the office. While traveling, graduate students are put in charge.
- One day a week there is a part (of the meeting) that is common to all students—research methods, submit application to grad school, and social events, etc.. The rest of time is spent in the lab.
- In undergrad pods, I assign research topics to students, read articles, and give them specific research assignments to complete; I use a step-by-step approach. I send e-mails,

weekly, that highlight (game) conceptualization and (game) design, and literature review tasks. Using this approach we have developed educational games.

- Meet weekly. Designed to meet twice a week, had a hard time doing this and they meet during normal class three times a week for one hour. Intro to A4RC, grad school, expectations for grad school, what is involved in doing research, presenting poster, how to read one. Had a library portion in which students went to the library and learned how to find resources (research) on a topic. Whenever possible, schedule guest speakers.
- *Pod provides students with important work ethics and information.* Whether they go to industry or not, ensure that they have all of what they need to make an informed decision about graduate school.
- Had one speaker from VA high tech groups. Make their presence on internet more professional. Had one of the REU students from VA tech (doing research) who was there prior to a4rc and talked about experience—has also been in industry. In addition, a professor visited and spoke on topics at VA tech when they go for summer.
- The intent is that they would be introduced to work so they could “hit the ground running.” Professor wanted them to code, implement applications, work with HCI, and mobile devices; essentially, to acquire hands-on experience before they get there. Unfortunately, the biggest disadvantage is that they could not get the equipment they needed—had dated hardware.
- Has them reading literature. Course material is more literature.
- Deal with general questions, to start. Research, graduate school, career choices, etc. someone may have a question about a myth they have heard of. Not necessarily intentional. Go around group, each person talks about what they have done. Some students have write-ups (not required) one pager of what they’ve done in the prior week and what they plan to work on. (Maybe should be requirement). Then we give them feedback, modified assignments. Other students may or may not give feedback. They think it is criticized. Especially at graduate level they are required to give feedback. They see it as critiquing, would rather do it more privately. Undergraduates work 16 hours per week.
- The (possible) requirement of writing the one-pager helps their writing skills. Also, can help them to organize their thoughts. Second pod has to send one-pager night before. By the end of the semester they have a 15 pager, which they can use for part of a paper.
- During the week between meetings, sometimes they (students) set up an informal meeting in between (e.g., a new student has joined and she/he had been reading materials, but had some questions.)
- There is an expectation that they will spend the 16 hours in the lab. They sign in and out. The students give the professor a schedule about how they will work the 16 hours but it is flexible. *The structure is especially useful for undergraduates—helps them put other*

*things aside and focus on project, gives them a better structure, and, when they're more mature, they will tend not to need that structure.*

- Graduate students work in the same lab. One of the students, who had not planned to go for the Ph.D., did an internship last summer working on a NASA contract.
- Right now they had to attack the age problem, genetic algorithms. Coming up to speed in research area. Had some experiments running with algorithms. Some times the grads were helping, kel helped with the write-ups, run the experiment. Also with the simulation pod, a couple of the grads went down to Georgia tech (Javier and toyan Harvey).
- *Have each of the grads and undergrads involved in some aspect of the research.* If we're looking at diferent areas, run experiments in particular areas, for a pod meeting, they might go around room and each person in research areas give update for what they've been doing for last week. Any problems with preliminary results. Other times, they may look at something new, have a paper or two they'll read over, spend some time in meeting breaking down the meatier concepts, because eventually they will need to run experiment, develop software or code so they grasp fundamentals.
- *Each person in the pod has something specific they need to do.* Sometimes there are contingencies. Grads might be looking for results being produced by undergraduates. If they haven't done what they needed to do, we ask them why not. If they haven't done, some of the problem is mentoring, the students' state of mind, the importance of the research, our expectations, this is not a scholarship. If they eventually pursue a Ph.D. they have to have a level of maturity to get the work done. They have to learn what they've been given to do. If they have questions they need to come to us and ask. But they need to get the job done. No one can afford to pay somebody for not doing their work.
- *When they come in they know what to expect.* We gave a research summary to undergrad colloquium. We wanted to get the other undergrads in the department excited. So the ones doing now were presenters. So they had to get up and talk: use the terminology they've learned concepts from papers, and understand the results. Not just give numbers, but help with interpret. Speak intelligently about some of those concepts. Did you do it, if so, what does it mean?
- Practically every day. Summer activities provided context for him to do work. Better to do things with others. Mainly work sessions. Were doing software development on the iPhone, he was typically developing the next steps in the plan, some pilot work, general idea about how something might be done, suggestions for how to do that. They were working on something where there had been a good start by students at CU in spring, barely completed in summer. It took all of them working quite a bit of the time. Pretty much, unless they had other stuff to do, the space where they were working was what he uses as an office. Conservative average is four hours/day.

## 5 Goal 3: Increase participation of African American students in computer science and computer engineering academic faculty careers

**Description of Goal:** Facilitate academic faculty, rather than industry, careers. Through participation in the networks of people who participate in the activities intended to accomplish the objectives of 2 and 3, industry collaborations, the research course, and participation in professional societies; these activities are expected to cement the identity of academic researcher as well as provide both human and financial resources to junior faculty.

Most of the interviewed faculty members were positive that the majority of the students in their programs are likely to pursue graduate degrees as a result of A4RC. However, they also agree that it is early for students to articulate their intention to take the GRE, during sophomore and freshmen years. One of the faculty members shared that students think it is hard to become a professor, thus it is best to try to persuade them slowly; the most critical thing, according to this faculty member, is for students to stay in their current institution for the master's degree and improve their math and research skills in preparing them to go to R1s. To talk about Ph.D. is a long shot.

### 5.1 Sustainability: Proposals, Grants, and Partnerships

In regards to outputs resulting primarily from involvement in A4RC, no faculty reported new proposals written by students, 75 percent reported that one new proposal was written by faculty, and 25 reported that three new proposals were written by faculty; no faculty reported grants awarded to student, 25 percent reported one grant awarded to faculty, and 25 percent reported two grants awarded to faculty; 50 percent reported that one student co-authored papers with R1 partner, 25 percent reported two students, and 34 percent reported that two faculty members co-authored papers with R1 partner; all faculty reported that there were no workshops held by students or faculty; 50 percent reported that one student was involved in a new partnership, 50 percent reported that three students were involved in new partnerships, 33 percent reported that one faculty member was involved in new partnership, and 67 reported three faculty members; and, 50 percent reported that students had more than four individual publications, 50 percent reported two individual faculty publications, and 50 percent reported more than four individual faculty publications. (See Appendix, Table 10)

- It's not going to work by schools; it has to be a bunch of researchers who want to get involved.
- If A4RC went away, the collaborations would be eternal partnerships. This is one of the most important outcomes—**Sustainable**.
- A4RC works because of individuals' commitments. It's a worthy cause.

#### 5.1.1 [Proposals and Grants](#)

The interviewed faculty said the following about grants and project funding:

- Wrote grant last semester. Students were interested in using PDAs, mobile devices, helping with learning (tech in classroom), HCI related, networking related, and Internet technologies. Some of the students' interest included using the web, enhancing the web to make it more applicable to all types of users, and security.
- Co-authored (grant). Mobile devices for collaboration, IIF grant HCI track, an is talking about other possible grants.
- Have gone in with other grants—possible that one relationship encourages another. Not just computer science, but different types of programs (e.g., Biotech). Has proposed a REU and will be using some of the modules for those activities. Maybe after the summer, they may be able to work it into a ten-week summer institute. (Documentation for how to do this would be useful).
- Loretta and he submitted something to Google, but have not heard back. They have other projects going on (e.g., proposals).
- Submitted a Google proposal that was not funded, but still think about relationship with Google.
- Two proposals: DHS center of excellence with Purdue and Purdue-Rutgers; Rutgers will get some money.
- They have leveraged funding: second pod is funded by ls-amp (?), master's students completely funded from that.
- NSF stage at Jackson state: one undergrad funded.
- They are now doing research in biometrics. There was no need to put together a grant proposal; they were approached by army research lab, so all they had to do was formally accept the funding and the responsibility to get the research done. Another proposal involved with homeland security, he helped prepare the proposal budgets and what the alliance was going to do. Doesn't know about the final outcome.
- Helping with proposal. What he's doing is something we haven't been doing. Was struck by a couple of things that he thought were good ideas: 1) experience that first year when we had lots of students lined up then they dropped out in favor of other internship opportunities. I remember thinking it was bad to think students took one great opportunity over another. I need to get out of the competing mode; 2) many reasons students would choose not to go to graduate school (e.g., make money or recharge financial battery). There are a lot of ways to get to the Ph.D.. I am excited to be in a situation where we can make the opportunities, that the students have, work FOR us. Keep the notion alive that they want to go to research in the future.
- Need data on how to get students who might go on at a later stage.

### 5.1.2 [Partnerships](#)

In regards to partnerships, one faculty member stated that while the project is working, there is need for more time to do what is needed. Some partnerships are already established, which is a good vehicle for sustainability. However, partnerships are hardest to establish among individual R1-HBCU faculty. The faculty member emphasized that “it takes time... community building takes time. After three years, relationships are just beginning and it will take time to consolidate them.” In other words, *in addition to funding and human resources, time is a critical factor for*

*the success of A4RC. Another faculty member emphasized that partnerships must be based on faculty interest rather than administration's matching of institutions.*

Faculty stated the following about partnerships:

- Listed industry partners include Google and State Farm.
- Right now, I don't think it is working. *The concept is good, but maybe the approach.* When we expanded to IN, any sort of research collaboration has to be two researchers who want to work together. We can't just have a person there and hope they will want to collaborate; there has to be a definite interest and only then can the collaboration happen. Can't just add school x and hope it happens.
- Relationships built that lead to collaborations, seeking joint funding, and research.
- The students experience would not have been possible (undergrads and grads working on a common project). Had done that in past with funding elsewhere, but not in a number of years has funding focused on students rather than on PI/CoPI/Grads. They will see more of that.
- Colorado is working with me on BPC collection, work with bobby/Maureen, Raquel hill on second pod; bridge to doc program at Indiana.
- They've always had a good relationship with VT. Currently a big relationship through other departments. With A4rc, the relationship with tech has been rejuvenated. They have not established a relationship with Colorado as they had hoped. One of their faculty graduated recently from boulder. And they do have some relationship with Georgia tech. relationships with Drexel.
- *They have industrial relationships already, usually on graduate level.* Some of them informal and some gaining formality. Hard to say what they would be doing; maybe depend on the nature of the research itself. Not sure if Felicia feels comfortable enough with the maturity of the research that would warrant getting together sponsors.
- They don't have time to do more, but indirectly it creates a culture where "these are the things we should be doing"
- They have their first NSF REU site. She's Co-PI. Indirect thing that encouraged faculty members to do this. Other guy invited her to be involved. A big part is to talk about the process of research. Used A4RC as prior work. Talked about concept of embedding research concept of how and why you do research, why pursue research career, taking some of the course. Helped with positive reviews. Novel approach of what people do at REUs. Funding for nine students.
- Kim has a new grant where she's a Co-PI. Loretta has a new grant where she is Co-PI. Indirectly related to A4RC.

### 5.1.3 [Sustainability... Beyond-Alliance Impact and Interest](#)

When asked about whether the project would continue beyond the alliance, they provided the following answers:

- If Loretta wasn't involved, it would continue at JSU. With respect to Clayton, there's Liz, but they haven't worked on research together. Doesn't know who on Colorado side would continue. They have the relationship with GT and Indiana, so even without Colorado, they are still interested in the concept of the pod. Even if one person gets a promotion or different job, still going to have this concept.
- With Maureen gone, still interest at GT to have students. *It is important to have more than one person.*
- *Different people are partnering with other university.* Either their advisor or other university, unless they worked somewhere else. She went to VT, so part of her partnerships. They are bringing in master's students; they're in the entire research project. Dr. Humphries is working on artsi (sp?), outreach portion of that. Mainly the BPCs are what they have undergrads are involved. Master's program classes primarily offered in evening. Some during the day, but students are likely to be working. Those who aren't they try to fund.

When asked about what they would do differently going forward, interviewed faculty provided the following responses:

- Overcome the challenge of doubling duties, i.e., if faculty are already working on projects—multitasking—try to make it match so they are not doing double duty. Make sure your research works with other universities. Part of reason for working with VT is location. They wouldn't want to travel too far. Thinks the younger group doesn't want to leave home. Most of the students from that pod are from Maryland.
- Pod model: provide, on the student level, an immersive long-term experience in research—a more realistic view of how research works. *They really get a chance to get experience and work with faculty members as peers in some sense. For faculty members, especially at HBCUs, some have projects and funding, gives them a collaborator to work with and keep them on task to keep work going. Ideally work with someone well known or becoming well known.* The collaborations with other institutions: everyone will do more of and that works.
- A4RC works because of individuals' commitments. It's a worthy cause. If you look at the Ph.D. degrees granted in the U.S., *there is a declining number of American citizens. The country has to do something. You have a group of committed people and they think they've found a way of working toward increasing of the numbers.*
- We're having a hard time nailing down how the time and money VT is spending is coming back to VT. It's been a three-year million dollar proposal, 100K went to VT and in terms of raw numbers of students in the grad program, ended up with 2. Even in terms of publications, some of the pods they had crumbled in the end.
- *If you get them (students) younger, they establish increased sense of ownership of project, you tell them this is a project that is going to go on for years and they may or*

*may not desire to be plugged into it.* Give them other reasons to work hard besides the punish/reward; that is, instead, give them the intrinsic motivation to want to do it. You don't automatically have a right to a Ph.D.. You have to step forward and demonstrate that you really want to and can do this.

- *They need to create flex in models so they can increase the number of pods and the number of institutions involved.* Not everyone needs funding. Most faculty members at REU PIs meeting said that most projects didn't give faculty money. But most of them already had funding through other grants. In some cases you'll need to give faculty money, but perhaps also give travel or stipend—can increase the numbers without breaking the bank.
- *The funding for students is extremely important. They're going to work at a part time job if they don't get funding from the research project. They can't work part time and keep their grades up and do the research project.*
- Another thing is to *set forth clear expectations for everyone who participates in pod.* Was looking at ARG model contract, here is what I'm agreeing to do. Not just students, but faculty at both types of institution, need to be realistic for everyone's time... because then people don't come back later and say they thought it would be different. Like having a mentor-mentee relationship, some of those models are really clear from the outset. *Not that it's successful or not successful, but different expectations.*
- For the new proposal: full funding for research pod, mini-grant for half a pod or less, affiliates (for certain benefits). They are trying to partner with ADME, there's an annual conference. Affiliates could go to conference. Have an informal pod, perhaps a little school that goes to the REU, leverage additional funding, and support structure to nurture other students at other schools.
- *Harder to get students when you're competing with major corporations, who begin recruiting in October.*
- Administrative thing: grant could be very taxing. I have received over 600 emails...over the course of the project.
- In terms of the research collaboration, *a more natural marriage between the two researchers to make a bigger impact.*
- There's two parts: *the issue of being an alliance and having the resources to run smoothly, from administrative point of view; then, making sure the research relationship is desired on both ends.* If the two researchers are enthused, it will carry over to the students.
- One of the things that came up briefly in the planning meeting in Atlanta is trying to frame the alliance that it would be open to any and all HBCUs—may be unrealistic. On the face of it, building interest is the way to increase the reach. *The bigger the circle, the more likely faculty-faculty interactions you'd have. It's not as if everyone at CU is in there participating, you just have a handful of faculty participating. The smaller the circle the more likely it will fail.*
- There's also a sustainability argument connected with government connection. *The same people we're competing with are the same people that could be really supportive of what we're doing.* We're hoping to have partnerships with those folks. Funding doesn't all

have to come from NSF, but do this as broader partnership (e.g., funds from industry and government).

- If he did leave he would make an effort to bring faculty in. There are other people who broadly do what he does, nature of research, general breadth of interest there. It is easier to do this as a tenured faculty member. From that point of view, not trivial to find someone else tenured. Tammy Sumner comes to mind.
- *Maybe the contribution to research is enough to justify the participation of a junior faculty member.* However, they have to be really organized, if they had funding and could hire grads.
- *We ought to be paying more attention to going forward—the faculty-faculty connection.* That's part of the model. Maybe the influence of that on what students do is not that huge. But in terms of the original logic of pod, it is a weak link.
- It is tough to solve the problem. Doing something more with travel. Maybe tracking people--likely conference participants, get members to go at the conferences they'd attend anyway. *Faculty just so busy all the time.*
- *Continue to increase the number of African Americans who would go to R1s and then return to HBCUs to make an impact—even beyond A4RC.*
- Continue to *foster efforts towards an equitable partnership between R1 and HBCU faculty*, i.e., to eradicate the status quo that research of R1 faculty is more valuable than that of HBCU faculty.
- Increased funding for the project

## SUMMARY

- Research methods courses/modules are helpful for undergraduates and graduates to understand the nature of, and steps involved in, research
- HBCU faculty share a great sense of hope in the future of A4RC, yet are concerned about funding—a foundations to motivate participation and sustain the program in the school
- HBCU faculty were positive that the majority of the students in their programs are likely to pursue graduate degrees as a result of A4RC.
- Help more students get involved in research and gradually get them ready to pursue a Ph.D. and the professoriate
- Pod provides students with important work ethics and information.
- Continue to encourage and help undergrads to do research
- The project drew me closer to undergrads as I am able to assist them to conduct research; however, I need to improve my relationship with them by getting to know them better and also placing a reasonable amount of pressure so they can be better prepared for graduate work
- If the two researchers are enthused, it will carry over to the students.
- The same people we're competing with are the same people that could be really supportive of what we're doing—we are hoping to have partnerships with those folks.
- We ought to be paying more attention to the faculty-faculty connection.

## 6 Recommendations

We recommend the following:

- Despite the fact that departments are aware of the A4RC project, **there is a need to get more faculty members involved.** This could take place by formally inviting faculty to A4RC meetings, sharing about the successes of A4RC in meetings and informal conversations, bringing A4RC activities that include the research interests of all faculty in the department such as symposia, renown guest speakers, workshops, discussions of potential partnerships, etc..
- **Make faculty feel needed in partnerships;** not only for departmental or program success, but also by showing how faculty can benefit by bringing in their own ideas and potential partners into the A4RC project.
- **Make more efforts to recruit graduate students into pods.** Undergraduate students rely on these role models and have shown great appreciation for their role; it will be very helpful for undergraduate students to participate in small pods with at least one master's and one Ph.D. student.
- **Continue to emphasize the importance of graduate education to undergraduate students and the importance of the Ph.D. degree to master's students.** Along with the importance of these degrees, emphasis must continue to be placed in the opportunities that such degrees open to students and the linkage between academic success and professional success—in academic research (or professoriate) as well as in research-driven industry.

- **Continue to seek faculty-faculty partnerships that are initiated by faculty and founded on their collaborative research interests.**
- **Engage in creating pathways to R1s.** While some faculty members are already engaged in creating pathways, there is a need for faculty to create clear and comprehensive pathways for students to enter R1s. These might also be contingent on faculty-faculty partnerships.
- **Publicize available funding opportunities among students** (undergraduate and master's), during their early stages in the program. Funding is a catalyst for student retention and interest in graduate student.
- **Develop mentoring relationships with students.** The data suggests that more work needs to be done in regards to building connectedness between faculty, particularly adviser, and students. In particular, we recommend that the master's students be made aware of what pods are doing and we recommend finding ways of connecting them with R1 research during the summer. **This is both the responsibility of advisors and faculty.**
- **Develop mentoring relationships with industry leaders** that allow students to see real-life applications of potential research topics. Faculty should be encouraged to participate in Mentornet.
- **Take advantage of existing partnerships with other BPC alliances (Empowering Leadership Alliances) and plan for existing remedies for potential isolation in white-majority institutions.** This alliance will furnish students at majority institutions with mentors, fund and promote travel to conferences (e.g., Tapia, Hopper), and bring students into a larger national community of underrepresented students in computing.

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Appendix: Selected Tabular Data

Table 1: Number of Faculty Involved in A4RC Project

One	14%
<b>Two</b>	57%
Three	14%
Four	14%

Table 2: Faculty Funded by A4RC

One	17%
<b>Two</b>	50%
Three	33%
Four	0%
Explain, if desired	
<ol style="list-style-type: none"> <li>one has received salary, two have received travel funding</li> <li>GT is not actually in the NSF grant this year, so no funding for R1 faculty here</li> </ol>	

Table 3: Student Involvement and Funding Source

	0	1	2	3	4	5	6	7	8	9	10	11	12
<b>Undergraduates</b>	20%	0%	0%	0%	40%	20%	0%	0%	0%	0%	0%	0%	20%
<b>Master's</b>	20%	40%	0%	20%	0%	0%	0%	20%	0%	0%	0%	0%	0%
<b>Ph.D.</b>	0%	50%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%

  

<i>Funding Source</i>				
	A4RC	Both A4RC and other source	Other funding source	Not funded
<b>Undergraduates</b>	75%	25%	0%	0%
<b>Master's</b>	25%	75%	0%	0%
<b>Ph.D.</b>	0%	0%	100%	0%

**Table 4: Undergraduates in Pod by Class Level**

	0	1	2	3	4	5	6	7	8	9	10	11	12
Freshman	50%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sophomore	0%	33%	0%	33%	33%	0%	0%	0%	0%	0%	0%	0%	0%
Junior	0%	0%	50%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Senior	50%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%
Fifth-year Senior	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

**Table 5: Number of Students Interested in Research Experience at R1—Summer 2009**

	0	1	2	3	4	5	6	7	8	9	10	11	12
Undergraduates	20%	0%	0%	20%	20%	20%	0%	0%	0%	0%	0%	0%	20%
Graduates	33%	0%	0%	33%	0%	0%	33%	0%	0%	0%	0%	0%	0%

**Table 6: Frequency of Research Pod Meetings Outside of Class for all Pod Members**

Not applicable	0%
Once a month	40%
Twice a month	0%
Once a week	20%
More than once a week	40%

**Table 7: Frequency of Meetings Held by Pod Subgroup**

Not applicable	50%
I don't know	16%
Once a month	0%
Twice a month	17%
Once a week	0%
More than once a week	17%

**Table 8: Research Courses/Modules Preparation of Students and Faculty for their Pod**

Not applicable	0%
Not helpful for anyone	0%
Helpful for me, as faculty mentor/advisor, to structure projects for students and to determine how much they know about research.	80%
Helpful for graduate students to understand the nature of research and the steps involved.	100%
Helpful for graduate students to structure projects for themselves.	20%
Helpful for graduate students to structure projects for undergraduates.	20%
Helpful for undergraduates to understand the nature of research and the steps involved.	100%

**Table 9: Estimated difference in student interest in graduate school resulting from A4RC's presence on campus.**

	PAST					
	I don't know	0	1-5	6-10	11-15	More than 15
# of undergraduates who <u>apply</u> to master's programs (whether admitted or not)	25%	0%	0%	0%	50%	25%
# of undergraduates who <u>are admitted</u> to master's programs	25%	0%	0%	50%	0%	25%
# of undergraduates who <u>apply</u> to Ph.D. programs (whether admitted or not)	25%	25%	25%	0%	0%	25%
# of undergraduates who <u>are admitted</u> to Ph.D. programs	25%	25%	25%	0%	0%	25%
# of master's students who <u>apply</u> to Ph.D. programs (whether admitted or not)	50%	25%	25%	0%	0%	0%
# of master's students who <u>are admitted</u> to Ph.D. programs	50%	25%	25%	0%	0%	0%
	Influence of A4RC					
	I don't know	0	1-5	6-10	11-15	More than 15
# of undergraduates who <u>apply</u> to master's programs (whether admitted or not)	50%	25%	0%	0%	0%	25%
# of undergraduates who <u>are admitted</u> to master's programs	50%	25%	0%	0%	0%	25%
# of undergraduates who <u>apply</u> to Ph.D. programs (whether admitted or not)	50%	50%	0%	0%	0%	0%
# of undergraduates who <u>are admitted</u> to Ph.D. programs	50%	50%	0%	0%	0%	0%
# of master's students who <u>apply</u> to Ph.D. programs (whether admitted or not)	50%	25%	25%	0%	0%	0%
# of master's students who <u>are admitted</u> to Ph.D. programs	33%	33%	33%	0%	0%	0%

Table 10: Outputs Resulting Primarily from Involvement in A4RC

New proposals written							
	N/A	0	1	2	3	4	more than 4
Student	50%	50%	0%	0%	0%	0%	0%
Faculty	0%	0%	75%	0%	25%	0%	0%
Grants awarded							
	N/A	0	1	2	3	4	more than 4
Student	0%	100%	0%	0%	0%	0%	0%
Faculty	0%	50%	25%	25%	0%	0%	0%
Papers co-authored with R1 partner							
	N/A	0	1	2	3	4	more than 4
Student	0%	25%	50%	25%	0%	0%	0%
Faculty	0%	66%	0%	34%	0%	0%	0%
Workshops held							
	N/A	0	1	2	3	4	more than 4
Student	0%	100%	0%	0%	0%	0%	0%
Faculty	0%	100%	0%	0%	0%	0%	0%
New partnerships							
	N/A	0	1	2	3	4	more than 4
Student	0%	0%	50%	0%	50%	0%	0%
Faculty	0%	0%	33%	0%	67%	0%	0%
Publications (not co-authored with R1)							
	N/A	0	1	2	3	4	more than 4
Student	0%	50%	0%	0%	0%	0%	50%
Faculty	0%	0%	0%	50%	0%	0%	50%

**Table 11: Student Involvement by Gender**

	0	1	2	3	4	5	6	7	8	9	10	11	12
<b>Male Undergraduates</b>	25 %	0%	0%	25 %	25 %	0 %	0%	0 %	25 %	0 %	0 %	0 %	0 %
<b>Female Undergraduates</b>	25 %	50 %	0%	0%	25 %	0 %	0%	0 %	0%	0 %	0 %	0 %	0 %
<b>Male Master's</b>	66 %	0%	0%	0%	0%	0 %	33 %	0 %	0%	0 %	0 %	0 %	0 %
<b>Female Master's</b>	25 %	75 %	0%	0%	0%	0 %	0%	0 %	0%	0 %	0 %	0 %	0 %
<b>Male Ph.D.</b>	33 %	33 %	33 %	0%	0%	0 %	0%	0 %	0%	0 %	0 %	0 %	0 %
<b>Female Ph.D.</b>	50 %	50 %	0%	0%	0%	0 %	0%	0 %	0%	0 %	0 %	0 %	0 %

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