# Board 78: ADEP: Asset-Driven Equitable Partnerships (WIP)

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# ADEP: Asset-Driven Equitable Partnerships (WIP)

**Abstract:** The mission of the Inclusive Engineering Consortium (IEC) is to enable MSI ECE programs to produce more and better prepared graduates from groups that have been historically underrepresented in ECE careers. We hypothesize that the key to achieving this goal is more fully engaging the students, staff and faculty at HBCUs, HSIs and TCUs in the broad ECE education and research enterprise by building partnerships with PWIs, industry, government labs, etc. These partnerships must be equitable with all voices being heard and all relevant assets identified and utilized.

The equitable partnership concept came out of a series of IEC workshops in 2021 that addressed Anti-Racism Practices in Engineering. Since that time, we have been applying the ideas developed and collecting feedback, particularly on barriers to their effective use. Anti-Racism Practices in Engineering should apply to students, staff and faculty in all activities in an ECE program. However, we have focused on research because it is THE activity that is the most underdeveloped at most MSIs and the primary reason why groups from PWIs usually contact MSIs.

MSIs need investment. People at PWIs must engage with their counterparts at MSIs so they will learn how to more effectively mentor, teach, and guide students from MSIs. Both types of institutions must invest in each other. Equitable partners must be able to identify and articulate their assets and understand the assets of other participants. Finally, partnerships only work if there is sufficient trust, which comes from knowledge of and engagement with one another.

## Introduction

The Inclusive Engineering Consortium (IEC) is a collaboration of 21 Electrical and Computer Engineering (ECE) programs from Minority Serving Institutions (MSIs) and similar programs from several Predominantly White Institutions (PWIs), along with several industrial partners. Established in 2019, IEC aims to improve the diversity and preparedness of Electrical and Computer Engineers by fostering collaboration among its member institutions. The IEC was born from a successful NSF-funded project that aimed to implement Experiment Centric Pedagogy (ECP) in 13 HBCU ECE programs [1]. The participants in this project realized that collaboration with each other and other institutions could bring numerous benefits to their education and research endeavors, which would be difficult or impossible to achieve alone. The IEC provides a new problem-solving framework to tackle challenges by pooling resources and taking a more global approach when necessary.

IEC Core MSI members – Alabama A&M University, Florida A&M University, Florida International University, Hampton University, Howard University, Jackson State University, Morgan State University, Navajo Technical University, Norfolk State University, North Carolina A&T State University, Prairie View A&M University, Southwestern Indian Polytechnic Institute, Southern University, Tennessee State University, Tuskegee University, University of Maryland Eastern Shore, Ana G. Mendez University Gurabo, University of Texas El Paso, University of Texas Rio Grande Valley, University of the District of Columbia, Virginia State University; IEC HSI Affiliate members – Texas A&M University Rellis, University of Texas Austin; IEC Affiliate members – Johns Hopkins University, Georgia Tech, Lamar University, Rensselaer Polytechnic Institute, Santa Clara University, Seattle University, University of

California Berkeley, University of California San Diego, University of Delaware, University of Florida, University of Illinois, University of Washington, Virginia Tech; IEC Corporate members – Fluke, Infineon, Intel, Keysight, Quanser, Tektronix

Initially, IEC has focused on building its network and establishing partnerships. During the ECP project, it became evident that the primary goal of creating a sustainable network of engineering faculty at HBCUs to focus on ECP was the driving force behind the IEC, but with a wider impact. The ECP network was formed through a series of in-person and online workshops and informational meetings, and the same approach was planned for the IEC. However, the COVID-19 pandemic forced the organization to change its plans, resulting in a series of mini workshops throughout 2020 [2]. The purpose of these workshops was to explore policies, ideas, training, infrastructure, and other topics that would support effective partnerships, and to address COVID-related issues as well. These workshops were followed in 2021 by another series focused on social justice: Anti-Racism Practice in Engineering: Exploring, Learning & Solutions (ARPELS) [3]. A key outcome of the ARPELS workshops was the concept of the equitable partnership.

The mission of the Inclusive Engineering Consortium (IEC) is to enable MSI ECE programs to produce more and better prepared graduates from groups that have been historically underrepresented in ECE careers. We hypothesize that key to achieving this goal is more fully engaging the students, staff and faculty at HBCUs, HSIs and TCUs in the broad ECE education and research enterprise by building partnerships with PWIs, industry, government labs, etc. These partnerships must be equitable with all voices being heard and all relevant assets identified and utilized. This has led us to address what makes an asset-driven equitable partnership and how to develop and sustain such partnerships.

Since the equitable partnership concept came out of the IEC workshops in 2021, we have been applying the ideas developed and collecting feedback, particularly on barriers to their effective use. When people from very different organizations come to the table to work together, they find it difficult to fully understand the assets each brings to the discussion and develop strategies that build on those assets. The challenges are greater when assets are not viewed equitably and, especially, if voices are not heard equitably.

Anti-Racism Practices in Engineering should apply to students, staff and faculty in all activities in an ECE program. However, we have focused largely on research because it is THE activity that is the most underdeveloped at most MSIs. Research and recruiting potential grad students for research are also the primary reasons why groups from PWIs usually contact MSIs. The two most important activities at MSIs - education and service (particularly student advising) - have rarely been part of the conversation.

This is a Work In Progress (WIP) because the problems addressed are big and have been with us for a very long time. To enable more and better minority graduates from IEC programs, we look at what they experience as students, which depends on what faculty and staff experience. This approach shows that MSIs need investment. People at PWIs also must engage with their counterparts at MSIs so they will learn how to more effectively mentor, teach, and guide students from MSIs. Both types of institutions must invest in each other.

Equitable partners must be able to identify and articulate their assets and understand the assets of other participants. They must also look at all assets, including the overall mission of each organization involved. MSIs tend to put teaching and advising ahead of research while PWIs put research first. Research builds reputations and establishes a hierarchy that makes the voices of those from strong R1 organizations much louder. Research should be viewed differently at most MSIs, where its purpose is to support the education of undergraduate students and not, necessarily, an end in itself. Boyer's model of scholarship has been very helpful in providing a richer context in which to address each partner's assets. Finally, partnerships only work if there is sufficient trust, which comes from knowledge of and engagement with one another.

In the following section, we discuss our **Plans** for an additional workshop to see how the ideas we have been developing on effective collaborations can work. A new tool we have developed – **The ADEP Equity Rubric** – is then presented, followed by the **Workshop Plan**. Finally, we list the key **Workshop Outcomes**, all of which represent activities in progress.

## Plans

As we shared what we have learned with people who are hoping to build productive working relationships with colleagues at MSIs, it has become clear that we needed to go back to what we tried to do in 2020 and get a representative set of our Core MSI Members in the same room (both in-person and virtually) as folks from PWIs, industry and government at the 2023 ECEDHA meeting to specifically address the barriers to real collaboration and identify the kind of long-term investments required on both sides to achieve success. We held this meeting on 17 March 2023, the day before the ECEDHA annual meeting in Albuquerque. The value of bringing these groups together was strongly reinforced by comments from the panel and participants at a recent NSF INCLUDES Network Conversation on 30 November: Building Partnerships with Minority Serving Institutions. The panel consisted of three excellent people from HBCUs: Greg Goins (NCA&T), Talitha Washington (Clark-Atlanta), and Renee Jordan (Morehouse). Their comments echoed what we have been hearing at our workshops. They expressed profound frustration with outside organizations that only appear when they want access to the very top students and do not show any interest in engaging with the faculty who educate and mentor those students. They stressed the importance of building a solid relationship with HBCU faculty and investing in the quality of the learning and research experiences students have. Dr. Goins said it well when he provided a Thanksgiving-based metaphor. He said that he was not interested in dividing up a small pie, he wanted a bigger pie. The IEC vision of more and better prepared graduates is a much bigger pie. For collaborations to work, the partners have to know one another, commit to one another, invest in one another, and take responsibility for one another's success. The INCLUDES Network Conversation showed that, while there are some examples of how to identify and address the barriers to equitable partnerships, they are very far from the rule. There is a lot of work to be done. Details on and a recording of the INCLUDES meeting can be found online. [4]

Each discussion we have had with potential partners has started with the following observation: all too often, faculty, students and staff from MSIs have been brought into a potential research collaboration (e.g., an NSF ERC proposal) very late in the process. Too late, to have any influence at all on the key research directions of the collaboration and, thus, too late to make good use of the resources and capabilities (assets) of the MSI partner. The share of funding offered also is characteristic of an afterthought, often forced on the main team by the funding agency. Thus, even when MSI programs are asked to join a substantive research effort, they are not allowed to play a role that is equal to that of other partners.

To address the challenges faced by MSI programs in partnerships with PWIs, we have developed a rubric based on the messages we have heard consistently from MSI faculty. This rubric is now being provided to potential PWI partners who are beginning to use it beyond their interactions with IEC. We provide the rubric in both informal early discussions, at workshops, for inclusion in proposals, etc. Note that the eight elements of the rubric were heavily influenced by ideas from the Science of Team Science [5], which IEC addressed in three of its 2020 mini-workshops.

**ADEP Equity Rubric**

This rubric has been developed by IEC to determine the level of equity in a partnership:

1. Asset Identification: Each partner has clearly identified and shared their assets (tangible and intangible) with one another.
2. Investment: Partners are actively investing in one another, not just through the sharing of resources but also by committing time and energy to building the partnership.
3. Inclusivity: All voices are heard and considered in decision-making, and there are mechanisms in place to ensure that marginalized voices are particularly amplified.
4. Specific Outcomes: Partners have mutually agreed upon specific, measurable outcomes that they are working towards.
5. Communication: Communication is transparent, regular, and involves multiple channels to ensure all partners are informed and able to provide input.
6. Adaptability: Partners are willing to adapt and adjust their approach as needed, based on feedback and changing circumstances.
7. Responsiveness: Partners are responsive to any concerns or issues that arise, and work to address them in a timely and effective manner.
8. Accountability: Partners hold themselves accountable for their actions and commitments, and work to address any issues that arise in a timely and effective manner.

This rubric can be used to evaluate the equity of a partnership by assessing whether the partnership is built on mutual respect, transparent communication and a willingness to invest in each other's success. Each category can be given a score, then total scores can be added to come up with a numerical characterization of equity. Such an assessment can then be utilized to monitor improvements in a partnership.

It's important to note that this is not a definitive and exhaustive list, it is a good starting point and can be modified to suit the specific needs and context of the partnership. (Note that the rubric was constructed with the assistance of ChatGPT. Putting a collection of related ideas into a standard format, like a rubric, is one of the tasks that AI seems to do well. We share this information when we share the rubric as an incentive for potential collaborators to improve it.)

## Workshop Plan

The IEC has developed a broad and very challenging vision of enabling MSIs and their students, staff and faculty to more fully become part of and contribute to the ECE enterprise. To realize this vision, this workshop brought together IEC Core MSI members with the heads of other ECE departments, especially those who lead IEC Affiliate members. Specifically, the workshop addressed topics identified by its members at previous workshops and that have been refined at

regular meetings; topics that have the potential to engage Core, Affiliate, and corporate members in Asset Driven Equitable Partnerships. Equitable partnerships are the foundation of the IEC, as the members work toward a status quo where faculty and students at MSIs are supported by the larger ECE community. By building relationships, the IEC and its partners can take steps to foster sustainable actions that share resources with groups with the most needs. The topics that have garnered the strongest support involve some aspect of ECE educational efforts, including:

- Tutorials for the 21st century ECE student and multi-university co-teaching
- Multi-university design experiences and vertically integrated projects
- ABET DEI Criteria Implementation – developing a collective approach and providing leadership for the overall ECE community.

In addition, technical activity groups are developing potential research topics addressing the following general areas:

- AI & Cybersecurity
- Semiconductors

The workshop was a hybrid mix of in-person and remote participants. The morning session was completely remote, while the afternoon session had hybrid presentations with breakouts offered with both in-person and remote formats. To realize the overall vision of the workshop to achieve the most engaging and productive research, education and service collaborations between IEC partner institutions, each breakout session was to produce a list of immediate short-term goals with proposed strategies, necessary resources, etc. identified. That is, what are the immediate next steps for IEC to address the session topic? In addition, a similar list of long-term goals were to be produced, again with any necessary resources/infrastructure identified. Prior to the meeting, participants were asked to review a document on ADEP and the rubric and the materials posted on the INCLUDES conversation from November 2022. These ideas were also reviewed briefly for both the morning and afternoon sessions.

**Workshop Outcomes**

First Morning (Remote) Session: The participants in the first morning session chose to focus on two examples of topics that fell under the umbrella of 'Tutorials for the 21st century ECE student and multi-university co-teaching.' Co-teaching is a topic that is very attractive to the core MSI members of IEC and has come up numerous times in discussions between faculty from PWIs, faculty from MSIs and engineers from industry. Two attendees had suggestions for potential collectively developed and offered courses that all workshop participants found very attractive. The first came from Petru Andre from FAMU, who has been active in the IEC community since the beginning of the ECP project. He has worked with Brian Skromme of Arizona State University on the Circuit Tutor (https://www.circuittutor.com/web/), along with faculty from two other core MSI IEC members. He has developed a similar software tool that is significantly more flexible and customizable than Circuit Tutor. It was decided to form a team to develop a plan for trying out the new learning tool at two or three other institutions and identify the necessary steps

and infrastructure to scale its use to all IEC schools. The necessary infrastructure is to be implemented through IEC and shared by all member programs, at least in the present plan. The team working on this project will also develop a proposal to obtain the necessary financial resources to provide access to IEC students. The long-term plan would be to go through a second scale up to bring it to students everywhere.

The second project idea came from Wayne Scales of Virginia Tech, a professor from one of our affiliate PWI members who has been participating in IEC activities for the last three years. He has developed an introductory course in Quantum Computing based on Thomas Wong's free textbook 'Introduction to Classical and Quantum Computing.' (https://www.thomaswong.net/). He is presently working with IEC core member faculty at Virginia State and Prairie View A&M to further develop and implement a hands-on course at these two institutions, which will serve as pilots for rolling the course out at all IEC schools. The scale up of this course will be done by a second team of collaborators along the lines of the circuit software project. Models will be developed, built on shared IEC infrastructure, which this team will use to obtain the necessary funding. In the near future, participants will be asked to complete an evaluation survey to determine whether or not the workshop met the needs of the participants. The survey will be conducted for those involved when both activities are established and a one or two page white paper has been written.

Second Morning (Remote) Session: The second morning session began with a briefing from two ABET representatives on the 'ABET DEI Criteria Implementation,' Michael Milligan and Leonard Bohman. While adding DEI to ABET Criteria was strongly supported by those in attendance, it was clear that the process followed by ABET did not leave the faculty teaching at MSIs with the feeling that they had a seat at the table. Voices were not being heard. It was decided to hold a follow up meeting at the end of May to better define a role for IEC to help facilitate the new criteria. An evaluation survey for this activity will be conducted after that meeting.

Afternoon (Hybrid plus in-person) Session: In the first session, an overview of AI & Cybersecurity activities was provided. In the second session, Semiconductor activities were addressed, which provided some good content for the two sessions planned on the CHIPS Act during the ECEDHA meeting. The next online meeting of the AI & Cybersecurity group is planned for Friday, April 21, 2023 - 10:30 am CST - 11:30 am, where two NSF funding opportunities will be discussed, with one group led by IEC MSI faculty and one led by affiliate faculty. For Semiconductors, a follow up meeting is being planned to address how IEC can contribute to workforce development.

The groups working in these two areas will be surveyed at the point where they have shared their ideas with one or more potential sources of funding.

Overall, excellent momentum was established for all topics except 'Multi-university design experiences and vertically integrated projects.' That is being addressed at a small number of IEC Core member institutions and in a large IEC project funded by the Department of Defense. [6]

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