

WEPAN Closing Session
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It's been a great meeting. So much networking. So many ideas. So many brilliant and courageous women, together conceiving a rich diversity of "bridge" designs that will lead more girls and women into engineering in the future.

I was surprised to have been contacted a couple months ago and invited to speak at this session. After all, I am not an engineer, and Delaware State University, where I am a dean, does not have an engineering program. Consequently I feel particularly honored and delighted to be here, and I want to use this opportunity to inspire each of you to take action to make a difference in your schools, colleges, universities, companies, communities, states, and countries! In this regard, I commend to you the example of Dr. Rollison, whose strategy was to make the Title IX case over and over again, to many different audiences, causing its momentum to build and ultimately leading a powerful person—Senator Ron Wyden—to take up the cause.

Allow me to remind you of the goals in WEPAN's new strategic plan:

- **Institutional Change.** WEPAN will be a catalyst for significant institutional change so that leaders of engineering programs are engaged in and committed to improving the climate and success for all women in engineering.
- **Resource and Advocacy.** WEPAN will be a leading resource for women in engineering and women in engineering programs.
- **WEPAN Vitality.** WEPAN will be a fiscally strong and effective organization.

I urge you each to review the goals, objectives, and actions in the strategic plan, which the conference organizers strategically gave us each a copy of. Your ideas and energies can help make progress on these goals and objectives.

As Debra Rollison said, in the U.S., Title IX is the law, and it mandates inclusion of women in just about everything at any educational institution receiving Federal funding. Title IX is therefore a tool for increasing the participation and advancement of women in engineering and making strides toward accomplishing the goals and objectives in WEPAN's new strategic plan.

But Title IX is only one tool. I want to make sure you leave this meeting prepared to use or engineer many other tools to catalyze and drive the changes that will invite, retain, and advance many more women in engineering, AND be consciously and deliberately inclusive of women of color (of whom we have too few here today).

Let me repeat here some of the ideas and tools shared in sessions and hallway conversations at this meeting. They are many and powerful, including:

- Finding, counting, **and planting** beans, like Dr. Priscilla Nelson. When the beans sprout and grow, women in engineering will benefit much more than they would

by just counting. Remember the story of Jack (Jackie?) and the beanstalk, which allowed him to climb to a new kingdom in the sky

- Creating purposeful new partnerships and collaborations like Dr. Nelson's "Partnership for Women of Industry, Government, and Academia." Every region in the country needs such a partnership.
- Injecting engineering into pre-college curricula, learning standards, and teachers, like Dr. Yvonne Spicer.
- Focusing on the whole-brain problem solving women excel at, rather than the left-brain problem solving engineers and engineering education are famous for, as mentioned by Dr. Gary Gabriele.

I want to start by emphasizing that there are actions ANYBODY can take—even students:

- Invite at least one person you met here to come to your institution to give a talk on her research, projects, or interests. This will help her advance (a "bean") and give more bright women engineers exposure and visibility in your organization. You don't need to stop at one—go for two or three!
- In meetings at work, please share your ideas as freely as you are doing here. Your ideas could be the ones that put your organization ahead. But they cannot do that if you keep quiet, like many women do in organizations.
- Open space for your female colleagues to shine. Ask for their ideas in meetings. Sing their praises. Toot their horn.
- Get together with other women—and with male allies—in the cause to organize and offer "survival skills workshops," where you learn from each other and/or from experts how to take control of your career to achieve greater success, faster. A young scientist had the idea for such a workshop series at Argonne National Laboratory, and organized it with her colleagues, including a female engineer, and women from the education and training offices.¹
- Volunteer in K-12 schools, to show girls that women can be great engineers.
- Nominate other women for awards, promotions, and leadership positions, especially for those project leader assignments needed to advance in one's career. I was in a group of managers a few years ago, who were brainstorming to choose the idea for the one proposal our organization was allowed to submit to a particular solicitation. The men were enthusiastic about basing the proposal on "Sally's" idea, and suggested we could have "Bill" be the PI. I asked, "if it is Sally's idea, why not have Sally be the PI?" They offered many reasons (too much administrative hassle, too much distraction, ...). I just kept asking, "why not have Sally be the PI?" Finally they agreed to have her be the PI, and she led the

¹ K. Laurin-Kovitz, D. Li, L. Phaire Washington, E. Gohoure, B.K. Hartline, M. H. Bhattacharyya (2003) Survival Skills for Successful Women Scientists and Engineers—A Series of Career Development Workshops. WEPAN 2003 Conference Proceedings.

preparation of the proposal, which was successful and received over \$1 million per year. What happens in those rooms, when you or I are NOT present?

- Volunteer to serve on worthwhile committees that are respected, have influence, and are visible at the highest levels. I am sorry to say that the best indicator of a committee's importance usually is the percentage of men on it.
- Get more women onto the list of experts the media call when they need to understand engineering issues in the news, for example the failure of the levees that were supposed to protect New Orleans. Protecting whole cities of people and helping everyone live safe, healthy, and comfortable lives are surely compelling and human reasons to become an engineer, that would readily appeal to girls and young women. Yet the experts I have heard respond to media questions have all been men. WEPAN should be in a good position to prepare and make available to the media a list of women engineers who are just as expert as the men currently called.

By working together and partnering regionally, nationally, and globally, even more is possible.

- Use the engineering culture and its values and strategies to catalyze epiphanies and drive change. What do I mean by catalyzing epiphanies? I mean helping people (mostly men), who don't have a clue about the issues and problems faced by women in engineering, to have an "aha" moment. The best common examples are the miraculous "conversions" of many fathers, whose brilliant daughters suddenly face those unexpected biases and barriers that simply don't crop up on the career pathways of males.
- Conduct departmental climate studies like those pioneered about 15 years ago in the physics community. Around 1990, physics department chairs commiserating about the low number of female students in their departments asked Dr. Millie Dresselhaus (MIT) and Dr. Judy Franz (now the Executive Director of the American Physical Society) what the problem was. These women were wise enough NOT simply to give an answer, but to propose that they could organize 'site visits' to interested departments to find out (applying a strategy used previously to assess the climate for minorities). Information on the site visit process and a summary of best practice from departments with significant female population is available through the web site of the American Physical Society, Committee on the Status of Women in Physics.² For a climate visit, a team of five women physicists visits a department (or government laboratory) after receiving an invitation from the chairperson. For many students, this is the first time they have seen five female physicists at one time. Engineering departments might benefit similarly.
- Think about and pursue strategies that will make very visible to leaders some irrefutable, quantitative, left-brain evidence that cannot be rationalized or

²<http://www.aps.org/educ/cswp/loader.cfm?url=/commonspot/security/getfile.cfm&PageID=67759>

Summarizes best practice in physics departments, and provides references to other resources.

explained away. These leaders can discover for themselves that there really IS a problem, and that their ACTION is NEEDED.

- Use or create policy levers to make a difference.
 - Advisory committees that ask questions about participation and climate (make program diversity and inclusion part of the standard charge to advisory committees).
 - Get ABET to formulate an explicit expectation for engineering departments about inclusion and diversity. We all know that departments are responsive to ABET.
 - Encourage colleagues to emphasize inclusion of women and minorities in their NSF proposals, to satisfy the "broader impacts" criterion.
 - In your review of NSF proposals (as an individual or as a panel member), hold the proposers to high standards with regard to broader impacts, and don't give them a high rating unless the broader impacts are well conceived.
 - Guide the media and the leaders in your organization to take notice of the successes of women in engineering.
 - Help governing boards to demand diversity and inclusion and hold the administration accountable.
 - Learn from the international community. We decided to do this in physics, where the participation of women is only slightly higher than it is in engineering. I am part of the Working Group on Women in Physics of the International Union of Pure and Applied Physics, and we have organized two international conferences on women in physics, which brought together women (and men) in physics from over 40 and over 60 countries, respectively, to share status and strategies³.

Finally, I believe that we will never achieve and sustain the change we seek and that engineering needs, if it is to take full advantage of the untapped ideas and innovation available from women and minorities, UNTIL we have gender and racial/ethnic balance among the activists of WEPAN, SWE, and other organizations working to provide access and inclusivity in engineering and science. I challenge WEPAN to change the face of its next conference—in Florida—by making sure that many more males and minorities attend. Males are important because they are in or have better access to the power structure of engineering. We can talk, discuss, and plan among ourselves for a long time, without yielding the results we are striving for. The presence of more men in our midst at WEPAN meetings is likely to help catalyze epiphanies, expedite implementation of our

³ B.K. Hartline & D. Li (2002), *Women in Physics: IUPAP International Conference on Women in Physics*, AIP Conference Proceedings CP 628; and B.K. Hartline and A. Michelman-Ribeiro (2005), *Women in Physics: 2nd IUPAP International Conference on Women in Physics*, AIP Conference Proceedings, CP 795. Note: all articles in both proceedings are available for free download from <http://proceedings.aip.org/servlet/Searchcat?queryText=Women+in+Physics&collection=CONFPROC&ResultMaxDocs=200&SEARCH-97.x=4&SEARCH-97.y=8>.

strategies, and model the inclusive and dynamic community of engineers we envision. In addition, we need to include a much higher fraction of underrepresented minorities, because the barriers they face are very much larger than those affecting white women.

Building this bridge to the future will be a challenging and highly worthwhile project that requires many planners, organizers, and workers. People who believe it can't be done, should definitely stay out of the way of the ones who are doing it. Keep up the good work!

Thank you.