

**2006-1752: PROMOTING WOMEN AS LEADERS FOR ENGINEERING: THE
ROLE OF INDIVIDUALS, ORGANIZATIONS AND PROFESSIONAL SOCIETIES**

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Promoting Women as Leaders for Engineering: The Role of Individuals, Organizations and Professional Societies

Abstract

This paper summarizes the activities and outcomes of a conference held in May 2004 at the University of Connecticut. As part of a series of conferences hosted by members of the Women in Engineering Leadership Institute (WELI), the *Summit* conference invited engineering stakeholders from academia, industry and professional societies to work collaboratively to develop action plans to increase the number of women leaders in engineering. The *Summit* produced ten blueprints for actions that can be undertaken by different groups and these are described in detail in the reference. The focus of this paper is dissemination of the different roles that (i) individuals, (ii) industry and academic organizations, and (iii) professional engineering societies can play to create a more gender equitable engineering profession, particularly realizing more women leaders in engineering academia.

Introduction

Greater integration of women into the higher echelons of engineering leadership – as managers, executives and deans – will result in benefits to society and industry, a more female-friendly culture in undergraduate engineering programs, and greater success at the high school levels in encouraging and retaining female students in science and math. Although many organizations have women in engineering programs, female engineering managers and female university faculty are missing among the target groups for these programs. A recent *Summit* hosted at the University of Connecticut by the Women in Engineering Leadership Institute (WELI) (www.weli.eng.iastate.edu) had the following underlying motivations:

(1) A network of diverse leaders is essential to the future of the engineering profession.

The solutions for advancing all areas of engineering will be better if based on a diversity of ideas and experience from people of different backgrounds and groups within society.

(2) The leaders of organizations and institutions are critical elements in defining the organizational culture that is essential to attracting and maintaining diversity in engineering.

Leaders are vital to setting future direction and should reflect the full diversity of our communities. Unfortunately, engineering leadership does not reflect the full extent of diversity in society today.

(3) Women leaders will attract more women and promote diversity at all levels of engineering.

Projections on workforce needs in the next decade suggest a need to tap all available resources and the most obvious untapped resource for U.S. engineering is the underrepresented groups – including women and minorities. Women and minorities do not see engineering as an opportunity for themselves because the “face” of engineering does not look like them and, furthermore, they have little first-hand knowledge of what the engineering profession is all about. Because leaders are often the most visible role models to the world for the university or company, diverse leaders are needed as role models to attract girls, young women and underrepresented men to engineering.

(4) Coordinated team efforts and resources could achieve greater overall lasting benefits than possible by individual organizations.

Many institutions and groups around the country are independently pursuing activities to increase the diversity of the engineering workforce. However, gaps exist between the efforts of individual organizations and national advancement of the status of women in engineering.

(5) A focus on the “pipeline” has often excluded specific efforts to enhance the number and quality of women in engineering leadership roles.

The aim of the *Summit* was initiation of a new coordinated vision that would include women leaders to bring sustained change to the culture of engineering organizations.

The *Summit* activities included a review of leadership styles and collaborative teaming activities, three panel discussions by active women engineering leaders, breakout group strategy sessions that identified and developed blueprints for action, and a planning session for future activities. There were two ultimate products of the *Summit*: a report documenting specific advice for groups to advance women leaders; and ten specific action blueprints. The full report can be downloaded from www.weli.eng.iastate.edu. The objective of this paper is to document the specific steps for how the following groups can contribute to increasing the number of women engineering leaders: 1) individual women engineers, 2) engineering organizations including universities, and 3) professional engineering associations. This information was generated by *Summit* panelists, speakers and attendees.

***Summit* Panels Structure**

There were three *Summit* Panels, one each day. The Panels were each comprised of three or four women in engineering leadership roles in 1) industry, 2) academia or 3) engineering associations. After each panelist was introduced, they were

invited to briefly share a little about the path which led them to their current leadership role, and to describe any issues that they deemed critical to affecting our overall ability to increase the number of women leaders and managers in engineering. The academic panel was further asked to expand upon the important issues that affect our ability to increase the number of women engineering deans and department heads. For the engineering associations panel, the panelists were also asked to comment on what they felt the role of these associations could be in promoting women leaders within both academia and industry.

Guidance from the *Summit* Panels can be divided into three types:

- a. Guidance specific to *Individual Women Engineers* – those seeking to be leaders and those who already are and want to be successful.
- b. Direction for how *Engineering Organizations* (industry, government and academia) can seek more women leaders or foster the culture that will encourage them.
- c. Views on the *Engineering Profession* and how *Professional Engineering Associations* can contribute to increasing the number of women in engineering leadership roles.

Advice to Individual Women Engineers

These accomplished women panelists from all types of organizations provided personal advice to individual women engineers that was valued by all. This guidance is also helpful for those who want to encourage or mentor individual women engineers. Women were encouraged to take risks and accept challenges. These challenges were identified as taking the form of technical challenges in new projects as well as learning about other disciplines such as public policy or finance. Knowledge of these other disciplines is needed for successful engineering leadership. Young women were encouraged to develop a career plan as soon as possible and to ensure they sought the broad technical experience needed in the first 5 years of their career to develop a solid foundation in their field. This applies equally to female engineers in industry and those in tenure-track academic positions. The competency this builds will be crucial to being seen as a good leader. While the panelists encouraged women engineers to be committed to their career and advancement in that career, they also cautioned that some of the best opportunities arise accidentally. Maintaining flexibility in one's career plan to enable pursuit of these new opportunities is ideal.

There was extensive discussion regarding the need for both mentors and role models. The panelists and participants echoed how critical it was to have a mentor without power over you in the organizational structure. This mentor need not be a woman. Mentors from both within and outside one's own institution were identified as a good way to learn the details on advancement within one's own institution as well as to provide a balanced broader view of how engineering

institutions work. The group saw a role model as different from a mentor. Role models are one part of the network of colleagues both within and outside one's own organization that are needed for success, career satisfaction and advancement. Women engineers were cautioned to select their organization very carefully and to explore the nature of the organizational culture as thoroughly as possible. One panelist recommended that a lateral move was not necessarily a bad thing if it brought one to a better culture. The majority of panelists were inclined to emphasize the need for overall life balance.

The panelists also offered advice to women once they attained formal or informal leadership roles. They indicated that strong decision-making skills were necessary. Every decision that is made by a leader should be well thought out and substantiated. Furthermore, with every decision the leader should set boundaries and enforce consequences as appropriate. After reaching a leadership role the panelists encouraged the maintenance of a peer network and at least one mentor. Also, a good leader should think of those potential leaders following her and ensure she strengthens her team to allow their leadership skills to fully develop.

It is very important that leaders have clear vision and that they share that vision. In academic settings the panelists recommended getting senior faculty on board as allies before seeking the change needed to accomplish one's own vision. Furthermore, the vision and decisions made must fit with one's own value system. The challenges of leadership require a clear sense of one's personal values and limitations. Leaders should remember to craft changes in such a way that the changes remain in place after they move on and therefore affect the long-term organizational culture. A leader cannot address all problems at once and it is absolutely necessary to focus on a few key priorities. Several panelists encouraged women to use their gender-based skills to their advantage. This included using and further developing teaming, listening and communication skills.

Direction for Engineering Organizations

In providing guidance to engineering organizations seeking to promote more women to engineering leadership roles, the panelists reiterated the need for an organization's management, right from the top, to understand the mechanisms used in effective leadership as discussed above. Furthermore, top leaders need to accept that true lasting change most often stems from the top. Higher management is ultimately responsible for addressing the lack of women leaders. Organizations would value women as engineers and as leaders more if they also valued the interdisciplinary work that more women tend to tackle. Organizations should take steps to promote mentorship and networking. Training and other opportunities through engineering organization ensures the system of support is available to all potential future leaders. Furthermore, ensuring a profound system of support is open to all throughout their career would be ideal.

Two critical organizational-level strategic tools were raised as a requirement for organizations to increase the number of women leaders in their ranks. These are things that individual women cannot accomplish on their own. They must be organizationally driven. First, diversity and diverse leadership must be explicit measurement criteria for the evaluation of projects and initiatives within the organization. This should include use of diversity metrics for funding decisions. Second, family-friendly policies are no longer optional; they are required to accomplish the diversity necessary for good business and for a strong future workforce. Organizations that do not actively pursue these policies for all members will be left behind.

The Role of the Engineering Profession and Professional Engineering Associations

In terms of advice to the engineering profession and engineering associations, the panels communicated the message that the profession must, as a whole, demand diversity. Associations can support all of the recommendations above for organizations and individual leaders. This need is most critical in academia. Individual faculty, especially junior faculty, are not empowered to ask for changes in the organizational culture or system. It is critical that engineering associations, as independent entities, spotlight universities on their relative lack of diversity in engineering. Engineering academia lags behind most other academic fields and lags behind business in having a diverse workforce and diverse leaders. It was suggested that it would be very effective for the professional associations to clearly and publicly ask universities “Where are your women department heads and deans?” The engineering profession must realize that it is within universities where the future engineers are trained and that the lack of a diverse academy is limiting the future of engineering. A diverse academy could attract and nurture a diverse workforce.

The panel discussions led to two recommendations for how the engineering associations could bring the profession to the public. First, they could be instrumental in the development of common metrics for diversity and they could apply them and publish the results. Second, they could involve the public in engineering events to make the contributions and activities of engineers more broadly known by the general public. If the engineering profession is better understood by the public, then a more diverse engineering workforce and more diverse leadership will follow.

Finally, *Summit* panelists and participants suggested that it is within engineering associations where much of the necessary networking and formal training of future leaders can take place. Within the engineering societies future leaders often undertake volunteer “trial” leadership roles. Engineering societies could cultivate these roles by offering more formal leadership training workshops for

engineers in industry and academia. The blueprints developed at the *Summit* are perhaps best suited to be undertaken by strategic national committees of our professional societies. The associations represented at the *Summit* communicated their intentions to sign memos of understanding to work together on various projects. Participants at the *Summit* suggested that increasing diversity and changing the engineering culture could be the niche that engineering associations need to move the associations forward as stronger organizations.

Conclusions

On the final morning of the *Summit*, the full group reviewed the conference activities in a large group discussion facilitated by the co-hosts. The objective of the “roadmap” discussion was two-fold: (i) to get people thinking about what they or their organization could do next; and (ii) to gain momentum for concrete action plans to increase the number of women in engineering leadership roles. The intention was not that WELI or the *Summit* attendees would necessarily pursue the specific action plans that had been developed, but rather that the information developed at the *Summit* be disseminated widely so others could pursue these actions. The *Summit* brought together a diverse group of engineering representatives and the planning work undertaken by *Summit* participants should be used by others who wish to promote women leaders in engineering academia and industry.

The potential future actions put forward by the group can be divided into three categories: actions to be taken by WELI; actions to be taken by all *Summit* participants; and finally, actions that should be pursued by “someone”. However, it was very clear after the *Summit* that this problem of attracting women in engineering leadership roles requires significant coordinated action. This issue is not currently being championed on a national level with the strength necessary to accomplish significant results. Given the motivations for the *Summit* described in the introduction, and the evidence that leaders change culture, there is a necessity to grow a diverse leadership pool. In fact, it seems essential to moving the engineering professional forward and addressing workforce development issues.

There is certainly a creditable argument that academia should undertake the cause of women engineering leaders and provide both the leadership and focus for this issue. However, the failure of academia to promote women full professors and leaders at the rate at which women engineering managers appear in the private sector leaves doubt that the academy alone can successfully promote this cause. Participants at the *Summit* saw the “women in engineering leadership torch” being best carried by professional engineering associations. Within these organizations, both industry and academia meet and the combined culture is distinct from each of the constituent parties. Engineering professional associations can ask the tough questions of academia that cannot be asked from within. While this paper and the footwork of the *Summit* participants has resulted in positive progress and awareness of this issue, this impact is minimal compared to what is needed to

accomplish change. If a national association were to grab not only women in engineering as a target cause, but rather women in engineering leadership, the payoff for a national effort would be exponential as the leaders attracted would serve as role models to future engineers, change culture and indirectly educate the public.

References

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