

**Final Report  
Women's Forum  
World Engineer's Convention  
Shanghai, China  
November 2 & 4, 2004**

## **Summary**

In the past fifteen years, international organizations and national governments have begun to recognize the urgency of increasing the participation of women in the sciences and engineering to address the interdisciplinary challenges affecting countries worldwide. There are numerous policies and initiatives to increase the representation of women in these fields. The second World Engineer's Convention (2004) hosted a Women's Forum to continue this dialogue. Co-organized by the Global Alliance and the American Association for the Advancement of Science (AAAS), the Women's Forum included a variety of events targeting female and male scientists and engineers from around the world and the general public. Progress has been made in government, education, and industry to encourage the retention of women in science and engineering. This report discusses promising practices in various employment sectors and describes the continuing challenges for women's participation.

### **I. Overview**

Worldwide, countries are facing environmental, energy, health and a myriad of other global problems. Women scientists and engineers have made significant contributions in many of these areas; however, much is still to be done and many more scientists and engineers are needed to research and solve these problems. Yet, women scientists and engineers from a diverse background of cultures and ethnicities are woefully underrepresented – a talent pool yet untapped by most countries.

Building on the success of the first World Engineer's Convention (WEC), the World Federation of Engineering Organizations (WFEO) invited the Global Alliance to organize the Women's Forum at the 2004 WEC held November 2-4. The Global Alliance for Diversifying the Engineering & Science Workforce is a collaborative initiative of the AAAS (American Association for the Advancement of Science), WEPAN (Women in Engineering Programs & Advocates Network) and AWIS (Association for Women in Science). Dr. Suzanne G. Brainard of the University of Washington and Ms. Yolanda George of AAAS are co-directors of the Global Alliance.

Motorola, Hewlett Packard, Ford Motor Company, National Science Foundation, and Microsoft co-sponsored this endeavor by providing travel and accommodation funds to international women speakers who made presentations at this international forum. Their contributions also supported the venue, logistical support, and publications for this event.

### **II. Background**

In the past fifteen years, international organizations and national governments have begun to recognize the urgency of increasing the participation of women in the sciences and engineering to address the interdisciplinary challenges affecting countries worldwide. There are numerous policies and initiatives to increase the representation of women in these fields. One of the most notable was the Platform for Action of the 1995 United Nations Fourth World Conference on Women. It is one of the strongest policy statements promoting women's advancement ever made by the international community. At the follow-up Beijing +5 meeting in 2000, a network of women's science and engineering associations succeeded in science and technology issues to the 50-page UN Report calling for further implementation of the Beijing Declaration and Platform for Action.

The second of these conferences was the 1999 United Nations World Conference on Science (WCS) held in Budapest, Hungary. It called for active promotion of women's participation through recruitment, retention, advancement strategies, data collection, and awareness campaigns at the national and international levels.

The World Federation of Engineering Organizations (WFEO), hosted at the UNESCO offices in Paris, initiated the first World Engineer's Convention (WEC) in 2000 in Hannover, Germany during the Expo 2000. The Expo 2000 was the first ever world exhibition to be staged in Germany. Its central topic was the correlation between "Humankind – Nature – Technology". The issues of various world conferences over the past few years, such as the UN Women's Conference in Beijing were addressed.

The WEC 2000 hosted a special Forum on Women in Science and Engineering that was international in orientation and addressed issues facing women scientists and engineers and advocates for a diverse workforce. It was unique because it integrated gender perspectives and international dimensions of science, engineering, and technology. The Global Alliance was invited to co-host, design, and implement the women's symposium. While having a strong emphasis on engineering disciplines, the WEC 2000 also paved the way for mainstreaming gender into engineering dialogues.

Recommendations from U.S. and international committees, taskforces, and conferences generally agree that integrative, multi-sector approaches by governments, educational institutions, professional societies, businesses, and non-governmental organizations are needed to ensure the full participation of women and girls in all aspects of STEM. The importance of increasing women's participation in STEM was again recognized in the continuation of the dialogue at the second World Engineer's Convention (2004) in Shanghai, China. The theme of the conference was "Engineers for a Sustainable Future".

### **III. Women's Forum of the 2004 World Engineers' Convention**

The Women's Forum included a variety of events targeting female and male scientists and engineers from around the world and the general public. Events were held on November 2 and November 4, 2004. The Global Alliance, Chinese Association for Science & Technology (CAST), and Shanghai Association for Science & Technology (SAST) invited engineers, scientists, and executives from all over the world to take part as speakers, panelists, and participants in breakout sessions.

The primary goals of the Women's Forum were to:

- Establish a global collaboration with corporations, educational institutions, government, and professional organizations to share strategies for diversifying the workforce;
- Focus on best practices in industry and education for increasing the participation of women in the engineering and related scientific professions, and research and evaluate the practices;
- Develop a strategic plan of action for the continuation and sustainability of this global collaboration;
- Highlight the achievements of women and organizations who have developed innovative approaches for incorporating women in the technical workforce; and
- Combine the added value of international cooperation and innovative effects of the paradigm changing approaches of women's research.

The November 2 events included panel sessions, a networking luncheon, and a public forum. Events on November 4 included a roundtable summit and traditional Chinese banquet. Detailed information about these events is available on the Global Alliance web site ([www.globalalliancesmet.org](http://www.globalalliancesmet.org)). In addition to the events in Shanghai, a virtual forum on women's issues was established to generate dialogue about the topic months in advance of the conference. It was hosted by the American Association for the Advancement of Science.

#### **III.A. Virtual Forum**

The WEC hosted several Virtual Forums on its web site of general interest to a large number of engineers internationally. Forum topics included Women's Participation, Young Engineering, Engineering Ethics, Industrialization, and the WEC Declaration. The Global Alliance, with technical assistance from AAAS, managed the Women's Participation forum. A link to this forum is available on the Global Alliance web site ([www.globalalliancesmet.org](http://www.globalalliancesmet.org)).

The Women's Participation forum had the following goals:

- Build a community of interest on women in engineering worldwide.
- Collect and share recent data on the status of women in engineering and women's participation by country.
- Identify research and reports that describe interventions, barriers to participation, policy strategies by country.
- Serve as a future source of information on women's activities within the WEC.

Dialogue was generated on a number of conversation threads such as higher education, workforce, work-life balance, the role of technology, and policy. The topics that generated the most interest were "Girls' choice of engineering and technical careers", "Balancing career and family", and "Women's advancement". Several postings discussed the need for dialogue to change to a more positive tone in order to be encouraging to young girls deciding which career path to take. To have a successful career and family life, spouses and partners must take an equal share of household duties. The Virtual Forum allowed many women to talk about issues of concern to them in a moderated chatroom.

Dr. Shirley Malcom of AAAS reported on the proceedings of the Women's Participation forum at the Galaxy Forum of the WEC on November 5, 2004. Several members of the audience asked questions about the geographic breakdown of forum participants and what the pressing issues to women were. Dr. Malcom agreed to continue the forum for several months following the conference.

### **III.B. Panel Sessions (November 2, 2004)**

The Women's Forum was launched with a series of panel sessions and keynote speakers. Eighteen speakers from over eight nations shared their experiences as scientists, engineers, policy experts, and advocates. Prominent keynote speakers discussed the status of women in the technical workforce, the policy developments in Europe and around the world, and the contributions women make to engineering design. Panel sessions provided attendees useful best practices information in various employment sectors.

Top-ranking female members of the sponsoring organizations including the Capacity-Building Committee of WFEO opened the meeting. The Secretary General and Vice Chair of CAST are women. The first keynote speaker was Mrs. Drina Yue, Vice President & General Manager for BCS Sector Asia-Pacific, Motorola. Mrs. Yue spoke about how to succeed in industry and about the need for engineering leadership. She encouraged women engineers and scientists to be mentors for young women, and encourage women to join the technical career path. Her presentation was very lively and generated much discussion from participants throughout the day.

The first panel featured two speakers, one from India and the other from the US, describing promising activities in higher education. Dr. Bethany Oberst from James Madison University provided information from her own experiences about how to succeed in academia. She noted that women are "on their own" in a university setting and need to be their own mentor. Women have different perspectives than men on engineering which are also valuable. She remarked that women's efforts to gain equity and justice are not self-centered but selfless.

Dr. M. Surya, University Librarian at Annamalai University, continued the panel discussion by discussing barriers for women in computing from an Indian perspective. The information technology (IT) sector in India is growing rapidly and a shortage of IT workers is predicted by 2008. IT is perceived by women in India as a place of opportunity, where recruitment and advancement are gender-neutral. In fact, she noted, the numbers of women have risen from 10% in 1993 to a predicted 35% in 2005. The growth of women in this field is having a positive impact on the balance of power between the genders as women start earning higher wages.

The second panel targeted promising practices in government and research laboratories. Mrs. Monia Boukari, Chief of Project for Agency for Rehabilitation & Urban Renewal in Tunisia, provided a case study of African women's success in the workplace. Because of fewer primary and secondary educational opportunities, the number of professional women in the workplace is small although the situation is changing for the better. As more women continue to gain access to higher education, their presence in all sectors of the workforce is growing. This trend is advancing the movement toward gender equality.

Mrs. Irene Muloni, Manager of Information Technology of Uganda Electricity Distribution Company Limited (UEDCL), discussed the status of women engineers in Uganda, using her company as a case study. The political situation in Uganda is quite positive to bring about change. The National Gender Policy and affirmative action plans create the policy environment for gender mainstreaming. However, the attitudes toward women scientists and engineers are still archaic, given the changing global environment. Few women choose to study these technical disciplines, yet financial obstacles and discrimination continue to hinder their efforts. Ms. Muloni highlighted the equal opportunity hiring practices of the UEDCL. She also discussed developing an objective metric for performance evaluations, skills training for professional development, and recognition of extraordinary achievement.

Dr. Sachiko Okuda, Senior Managing Director of FCG Research Institute, spoke next about how her company has a strong track record in recruiting women scientists and engineers. It strives to hire scientists who understand the needs of the end-users of their products. FCG develops an array of beauty products. Dr. Okuda noted that more men are represented in divisions that design hair dryers and other cosmetic products, but she predicts that the numbers will change over time. In Japan, women make up 11% of the researchers in the workforce.

The second keynote speaker of the morning was Ms. Molly Zhang, Site Director for the Dow Chemical Company (Map Ta Phut, Thailand Office). Ms. Zhang described traits of women that are valuable in the workplace, such as inspiring staff, building relationships, and being supportive. She further added that women are the major influence behind many consumer purchasing decisions, so engineering design must consider their needs to be profitable. A "best practice" at Dow has been the establishment of the Women's Innovation Network (WIN) that advances Dow's gender diversity goals. It provides networking, mentoring, skill development, and a community for female employees. In addition, Dow expects its leaders to be role models to create an inclusive, diverse working environment. Dow also offers a host of other staff development programs and services available to all employees.

Ms. Jennifer So, Asia Pacific Inclusion & Diversity Program Manager of Hewlett Packard (HP), wrapped up the morning session with her presentation about promising practices at HP. Her office is dedicated to creating an inclusive environment at HP to further its business goals. HP uses diversity metrics to select its suppliers and measure performance. They offer mentoring programs and regional and international summits for women employees to connect. Recognizing that very few of the world's population has access to computers, HP also has many outreach programs to establish IT infrastructure to provide access to newer technology. As with all the keynote speakers, Ms. So reiterated that diversity is valued and is considered a priority from the top-most levels of the company.

### **III.C. Networking Luncheon (November 2, 2004)**

The lunch was served in the European Room at the Oriental Hotel. Dr. Shirley Malcom, Director of Education and Human Resources of the American Association for the Advancement of Science, and Dr. William Wolf, President of the National Academy of Engineering (US), opened the session with welcoming remarks and provided comments to stimulate lunch conversations. Dr. Wulf stressed the importance of women in the engineering design process and applauded the World Engineer's Convention for providing a venue for such dialogue. Attendees of the morning sessions shared their own experiences on development of women engineering talents. This was also the opportunity to ask questions of all the morning panelists and speakers. Younger participants at the lunch took the opportunity to ask the more senior women about the challenges they faced to succeed in the male-dominated science and engineering professions. Numerous members of other WFEO standing committees joined the Women's Forum participants at lunch to listen and gain awareness of gender issues.

### **III.D. Public Forum on Women & Development in Engineering & Technology (November 2, 2004)**

A large public forum dedicated to Women Scientists and Engineers was held at the Shanghai International Conference Center in the afternoon. The theme of the forum was "Women and the Development of Engineering". Over five hundred participants from 22 nations attended this session. The event was covered by many international news organizations, which allowed the message of the event to reach a larger audience. Simultaneous translation devices were available to the audience to make this event accessible to all.

The welcome speech was given by Ms. Viu Maya, a leader from Shanghai city government. She congratulated the China Association for Science and Technology (CAST) and China Women's Federation for co-hosting the Women's Forum of World Engineering Convention. She noted that women engineers have contributed significantly to the material civilization and social development in the last century. She introduced the three women who were invited to share their opinions of the state of women in the technical fields.

Mrs. Shen Xiufan, Shanghai Women Engineers Association; Mrs. Chen Yantang, President of Hong Kong Association for Women Engineers; and Dr. Shirley Malcom of AAAS provided some comments about their respective regions. After their comments, a moderator opened the floor up for questions from the audience. A variety of questions were posed to the three women who provided some thoughts about how to increase the number of women in the field and the role of engineers in international development activities. In addition to bringing together diverse perspectives of prominent women in engineering and science, this forum served to raise public awareness of the dearth of women in technical fields.

### **III.E. Roundtable Summit on Development of Women Engineers' Talents (November 4, 2004)**

The Roundtable Summit was sponsored by Shanghai Association for Science and Technology (SAST). Representatives from different countries discussed gender equality in science and technology education; removing obstacles to women in scientific and technological careers; and improving the collection of gender disaggregated data for policy makers. In addition to discussion, the Summit also drafted a platform for action that it requested WFEO to adopt as part of its 2004 Declaration under development.

The leaders of SAST and CAST opened the meeting, thanking all the participants for attending. The current president of WFEO, Dato Ir. Lee Yee-Chong, also attended this event to express WFEO's support of the goals of the Women's Forum. He agreed to take the platform for review at the next WFEO executive meeting. Roundtable participants included: Dr. Shirley Malcom, Director of Education & Human Resources, AAAS; Ms. Cheng Donghong, Secretary General of SAST; Ms. Yin Yicui, Deputy Secretary General of Shanghai Municipal Government; Ms. Susan C. Kemnitzer, Deputy Division Director (Education), National Science Foundation; Dr. Suzanne G. Brainard, Executive Director, Center for Workforce Development, University of Washington; Ms. Yolanda George, Deputy Director of Education & Human Resources, AAAS; Dr. Lydia G. Tansinsin, Past President of Philippine Association for the Advancement of Science; Dr. Cathryn Hlavka, Science Consul, Australia Consulate General; and Dr. Xie Qi Hua, President of Bao Gang Steel Company.

The availability of simultaneous translation enabled all the participants to engage in lively discussion about barriers to women's advancement. Several members from Shanghai expressed frustration at the mandatory retirement age because women were required to retire ten years earlier than men. A fixed retirement age is necessary to open up employment for new graduates in science and engineering, given China's large population. An unintended consequence of this policy is the prevention of women from advancing to top leadership positions, which typically require years of work experience. Although they noted that their time is now spent on volunteer activities, they felt that their contributions to society were curtailed because of early mandatory retirement.

The conversation from the Roundtable Summit continued over a traditional Chinese banquet sponsored by SAST. The Women's Forum Banquet created a wonderful opportunity for women engineers and scientists to communicate and share knowledge with international counterparts in a more relaxed, social setting. The Roundtable participants attended this banquet.

### **IV. Discussion and Outcomes of the Women's Forum**

The primary goal of the International Forum on Women in Engineering and Science was to share international best practices in industry, academia, and government. Some nations and corporations have become innovators in providing an encouraging environment for women to enter the technical professions – a necessity that increasingly has become recognized among employers across the world. Representatives from corporations, academe, government, and professional associations shared their organization's strategies to encourage the recruitment, retention, and advancement of women in their organizations and beyond.

The presentations at these events provided a wide array of information from individual nations. Messages that

stood out from the panels were that the educational environment for girls is changing as more women are getting access to higher education. More women are choosing to become scientists and engineers, so over time the workforce demographics may catch up. The policy environment is also protecting women's rights to work along side men in technical fields. However, social discrimination, traditional views of women's roles, work-life balance issues, and financial barriers still hinder women's progress. Finally, well-intentioned government policies such as early retirement may have unintended consequences that prevent women from advancing.

Speakers from the corporate sector noted several key elements to building gender diversity into industry practice. They acknowledged repeatedly that women engineers and scientists are a part of a sound business strategy. As primary decision-makers and end-users of many products, it just "makes sense" to include them in the design process. To create a gender-inclusive work environment, policies from the top-down need to be implemented and enforced. For example, leading high technology companies are requiring recruitment and advancement of diverse staff as part of managerial performance reviews. In addition, corporations are establishing professional development programs specifically targeting female professionals.

The forum also served to promote greater awareness of the challenges facing women in the technological fields. International forum attendees were not the only people to benefit. Many men and women attending the technical sessions were able to converse with Women's Forum participants. The Forum also received coverage from the press in newspapers and radio coverage. SAST developed booklets about women's contributions to science and engineering to commemorate the World Engineer's Convention.

Finally, to continue collaboration, SAST, CAST, and the Global Alliance have agreed to collaborate on a series of international meetings to be held every two years. The Global Alliance network is working to expand its collaborative activities to all parts of the world. The next World Engineers' Convention will be held in Brazil in 2008, and early planning sessions include women's forum events.

## **V. Dissemination & Impact**

The international community has agreed upon several strategies to increase the awareness of women's need to participate actively in science and technology research and development, leadership, and policy development. The World Engineer's Convention is an ideal venue to advance the recommendations from the Fourth World Conference on Women, Beijing +5 meeting, and the World Conference on Science.

Information about the meeting was disseminated through women engineering societies, WEPAN, and several international list serves, including the Global Alliance, AAAS, and Women in Global Science and Technology (WIGSAT), SAST, and CAST. In addition, presentations about the Women's Forum will be made at a variety of meetings and international conferences including American Society for Engineering Educators (ASEE), Women in Engineering Programs & Advocates Network (WEPAN), International Conference of Women Engineers and Scientists (ICWES), AAAS, Beijing +10 meeting and others. The Beijing +10 meeting in March 2005 will bring people from all over the world to raise awareness of women's role in society.

## **VI. Conclusion**

The WEC Women's Forum generated considerable interest and awareness for the situation of women in the technical professions among conference attendees and the general public. It created many opportunities for networking and international collaboration, bringing together over 500 women from 40 nations. It is expected that this meeting will continue to mobilize groups in other countries to consider the added value that women bring to the science and engineering field. Similar meetings are sponsored by the United Nations, other nongovernmental organizations, and professional associations who continue to publicize these issues. The World Federation of Engineering Organizations (WFEO) will host another Women's Forum in its 2008 World Engineers' Convention in Brazil.

The co-sponsors of these events (Motorola, Hewlett Packard, Ford Motor Company, National Science Foundation, and Microsoft) made it possible to bring a large group of innovative and successful women together to share best practices in promoting the participation of women in the science, engineering, and technology professions globally.