Celebrating 50 Years of ICWES

In conjunction with the 1964 World's Fair, the first global gathering of women engineers and scientists took place 50 years ago in New York City. Spearheaded by the Society of Women Engineers, it set in motion a movement that for the next five decades kept the spirit of that first event alive, with participants meeting in approximately three-year intervals, inspiring successive generations of women, and giving birth to a new organization.

By Sandra Guy, SWE Contributor

Today, female entrepreneurs, especially those in technology, seize headlines in major magazines and newspapers for their ingenuity, resourcefulness, planning smarts, and leadership strategies. The same skills, multiplied several-fold, applied 50 years ago when SWE leaders and members put together a historic meeting of women engineers and scientists from across the globe — with no Internet, no apps, no smartphones, no online travel reservations, and with hard-and-fast borders and Cold War suspicions.

Written correspondence took place on typewritten letters sent via the postal service, and people talked in person or on rotary telephones plugged into the wall. Personal long-distance phone calls were a rarity and a luxury, and required operator assistance to reach overseas.

Imagine being part of a coterie of women engineers and scientists seeking to connect with others throughout the world, and to organize and meet in the first formal international gathering.

Setting the stage

The effort started four years before the conference took place, according to historic SWE reports. The conference's delegates and registration committee sought out eligible delegates by sending letters to embassies, ministers of education, engineering schools, engineering technical societies, business and professional women's clubs, and university women's associations worldwide.

The conference organizers, who started with only 40 names of women outside of the United States, did their homework and ultimately sent out 5,000 letters to international sources and developed a list of 6,000 possible U.S. delegates. The list of 6,000 was put on IBM "punched" cards for future reference, and included educators, guidance counselors, women's societies, deans of engineering schools, SWE contact lists, and companies that employed significant numbers of women engineers.

In addition to the challenges of finding one another and establishing communication, a host of financial and logistical problems had to be solved. Imagine a determined group of women moving ahead despite these issues, and in their spare time, laying the groundwork for the First International Conference of Women Engineers and Scientists, otherwise known as ICWES I. The historic conference took place June 15-21, 1964, in New York City, then-headquarters of the Society of Women Engineers.

SWE itself was only 14 years old, with fewer than 800 members in 16 professional sections, so the then-fledgling organization enjoyed a big boost by being able to pull off such a feat — even obtaining recognition from President Lyndon B. Johnson, *The New York Times,* and leaders at the World's Fair in New York. Indeed, members of SWE's New York Section came up with the idea to host the Society's national convention, as it was called at the time, and ultimately, the international gathering, concurrent with the 1964 World's Fair.

An inspiring keynote

The keynote speaker — Lillian Moller Gilbreth, Ph.D. — proved a hugely moving role model. Dr. Gilbreth, a psychologist and industrial engineer, was known as the "first lady of engineering," the mother of modern management, and the first American engineer to put together ideas based on psychology and scientific management, according to historic records. She also was one of the first working female engineers to earn a Ph.D., and the first person to earn a Ph.D. in industrial psychology. The

mother of 13 children — 11 of whom lived to adulthood — she was the mother in the popular book, *Cheaper by the Dozen*.

Alva Matthews Solomon, who chaired the hospitality committee at ICWES I, told SWE Oral History Project interviewer Lauren Kata in a May 14, 2003, interview that she (Solomon) was "just so thrilled" to pick up Dr. Gilbreth from the airport and drive her to the hotel for the conference. Solomon said she considered Dr. Gilbreth and SWE's officers amazing leaders. "They really saw that SWE had an important role to play in educating women and giving them a place to share thoughts, and maybe even to use for networking," Solomon said in the interview. The role models she met proved influential, as Solomon went on to earn a Ph.D. at Columbia University and became the 1971 SWE Achievement Award recipient.

In her keynote address, Dr. Gilbreth noted that this first international conference focused on the future — specifically, the future needs of the world and how female engineers could address those needs. The conference resulted from SWE members' analytical reasoning that they should spearhead the event as a service project. Such reasoning was behind SWE's organization, too, Dr. Gilbreth said.

"The engineer has obligations toward mankind, as have all professional men and women,"

The Unisphere was the symbol of the New York World's Fair. According to *The New York Times*, 51 million people visited the globe and surrounding fountains. © JaysonPhotography

ICWES Locations

1964	New York City, United States (hosted by SWE)
1967	Cambridge, England
1971	Turin, Italy
1975	Krakow, Poland
1978	Rouen, France
1981	Bombay, India
1984	Washington, D.C., United States (hosted by SWE)
1987	Abidjan, Ivory Coast
1991	Warwick, England
1996	Budapest, Hungary
1999	Chiba, Japan
2002	Ottawa, Canada
2005	Seoul, Korea
2008	Lille, France
2011	Adelaide, Australia
2014	Los Angeles, California, United States (hosted by SWE)

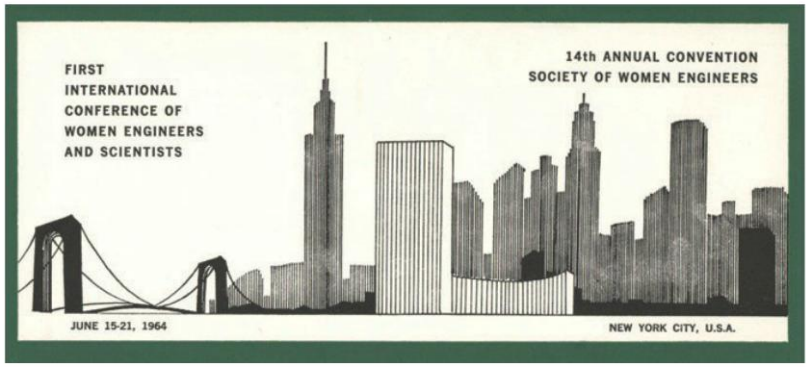
she said. Those include furthering the profession's growth; accept, maintain, and, if possible, raise its standards; and help educate and train its members.

The international conference dovetailed perfectly with SWE's reason for being, Dr. Gilbreth said. "Why women engineers? And why a Society of Women Engineers?" Dr. Gilbreth asked.

"Because the profession needs women, and because they need the opportunities for work that the profession affords," she said. "Because women need the feeling of group solidarity that an organization gives. Because young women need knowledge of engineering, help in being tested, educated, and trained if they have interest and the necessary aptitudes. Because many women, young and old, need the opportunities the profession gives."

Dr. Gilbreth, then 86, described the international conference as "a needed opportunity to think and plan together" and "to recognize and evaluate our likenesses and differences."

"The future demands we utilize both," she said. "If we are to work together effectively, we should recognize that, while each of us is different from every other person, our likenesses are of great importance. This applies both to skills and to satisfactions."



ABOVE: The theme of the conference was "Focus for the Future: Developing Engineering and Scientific Talent." Sessions covered topics on industrial, social, and standard of living needs; reports on the current status of engineers and scientists; and developing engineering and scientific talent.

FACING PAGE: SWE member Alva Matthews Solomon, right, greets Mrs. D.S.K. Leighton of the U.K. Women's Engineering Society at J.F.K. airport. As chair of the reception committee, Solomon reflected on the significance of the first ICWES in an oral history interview conducted more than four decades later.

As SWE and ICWES celebrate ICWES' 50th anniversary at this year's joint WE14 and ICWES16 conferences Oct. 23-25 in Los Angeles, SWE and INWES leaders say that both organizations today provide valuable networking, career development, public-policy backing, and just-plain-wonderful experiences for women, much as they did at the start — as women continue to battle to make their voices heard in traditionally male-dominated fields.

Exceeding expectations

The grass-roots effort to put the first ICWES conference together garnered impressive results, including big-name recognition, highly regarded speakers from throughout the world, more than 60 papers presented in technical and professional sessions, and once-in-a-lifetime "inside" looks at the World's Fair.

The conference's day at the World's Fair featured a behind-the-scenes tour of General Motors' view of tomorrow and exhibits by the Bell System and General Electric, according to the *SWE Newsletter* of July-August 1964. A boat trip was included in the conference's 44-page program at the last minute, after Ford Motor Co. came through to pay its $2,000 cost, according to a story recounting the ICWES history in the February/March 2002 issue of *SWE Magazine*.

When the delegates gathered at the Federal Pavilion — representatives hailed from 35 nations and all 50 U.S. states — they were welcomed by Seymour Potter, chief engineer of the New York World's Fair Corp., and introduced by Blanche H. Dow, Ph.D., president of the National Association of University Women. Beatrice A. Hicks, the first SWE president, read to the conference a telegram from President Lyndon B. Johnson offering his "best wishes for a successful conference," the newsletter reported. Another account said Lady Bird Johnson also sent a telegram calling it "gratifying" to see women "devoting their great talents and abilities" to such highly technical fields.

Reporters from *The New York Times* and *The New Yorker* covered the conference's events and reported on its atmosphere. Delegates hailed from as far away as Germany, Iran, Ireland, Japan, the Philippines, Switzerland, the U.K., and the U.S.S.R, among others. The registration of 529 people was double the attendance that SWE had anticipated.

The conference wasn't without a few hitches, though, including unscheduled speakers seeking to present their papers. "We felt that arbitrary rejection would have been diplomatically unwise, as the embarrassed delegates would return home and report on their experiences," according to an internal SWE report from the association archives. SWE

reviewed the unexpected contributions, offered help with the English language, and offered on-the-spot translation services for those who couldn't deliver their presentations in English. "We believe that the way this was handled left the delegates with a feeling of pride in their contributions," the write-up said.

Indeed, the sessions were simulcast on closed-circuit TV to overflow audiences, recorded on "magnetic tape," and translated into three languages: French, Spanish, and German.

Outgoing SWE President Aileen Cavanagh didn't shy away from pointing out contentious policy issues of women's pay and technological excess. She said in her opening remarks that the interests of the groups attending the conference included underlying differences. Cavanagh noted the competing interests of the demands for women in engineering and science from government, education, and industry, including a need to stabilize costs and create a strategic work-force reserve by hiring women.

She also warned that "we live in a time when our worth as individuals depends on the ability of the total human race to achieve the maturity of self-recognition and self-discipline." Cavanagh added that "we feel that without that maturity, a blind and undirected pursuit of technology for its own sake could destroy human dignity and thus become a force for evil."

Personal recollections

The conference helped bridge cultural gaps for some attendees. Margaret Ann Pritchard, P.E., F.SWE, and a member of the College of Fellows for the American Society for Engineering Management, was credited in the *SWE Newsletter* with leading a "lively songfest" with Isabel Hardwick, a member-at-large from London, after the World's Fair tours, as the women spontaneously started sharing folk songs from home.

Pritchard recalls spending eight "marvelous" days with an engineer from Japan who was her roommate during the first ICWES conference. Even though she did not know any Japanese and her Japanese counterpart spoke only six words of English, the two became fast friends. Pritchard also appreciated talking with women from other engineering disciplines.

"When you walk into a room and have women from 17 disciplines, all having a cup of tea and chitchatting, it's marvelous," said Pritchard, who is a retired industrial and mechanical engineer. Pritchard came to call upon the women from other disciplines in her consulting work. "I could pick up the phone and call Jeri Ann, and she could give me advice — do this and this and this."

Indeed, Pritchard believes the kinds of basic technical problems that engineers solve — and those addressed at ICWES conferences — can solve the world's problems.

"How are we going to save the earth? Feed ourselves? How are we going to get along on a very fundamental ICWES-

"I think it was quite amazing. ...one phase was having the visiting people connect with the American engineers. So there was one night where there were dinner parties all over the city. And the people from Japan, and the people from Syria, and the people from England, and all the various countries, we loaded them into taxicabs and had them taken to these private homes for the dinners."

– Alva Matthews Solomon, ICWES I Reception Chair

type basis — helping each other solve problems? I believe firmly that the mess the world is in politically, if we go back to solving technically oriented problems, get back to the fundamentals, we'd be a hell of a lot better off," she said.

Carolyn Phillips, P.E. (ret), F.SWE, past SWE president and a current SWE trustee, recalled grasping that women in other parts of the world faced "more significant issues," such as being treated equally and living in a peaceful country.

"I was still kind of 'green around the edges' — all of 24 years old," she said.

Phillips picked up some of her greatest insights while helping set up the meeting and doing grunt work as events got underway. "I was part of our own SWE shuttle service to Kennedy Airport, since we were trying to help keep costs down and be friendly and hospitable to overseas visitors," she said.

"I hadn't had exposure to women from other cultures, and I found it fascinating that they had many of the same concerns — to be treated equally, for their countries to be peaceful, and for their children to get a good education," Phillips said. She was particularly impressed with the notable women engineers of the day, including Hicks and Gilbreth. Phillips said she was excited to meet "these exotic women" and to be part of pulling off such a feat.

Behind the scenes

In addition to SWE's arranging the financing for the conference, some of the women had to work through their governments' bureaucracies for permission to travel and obtain hard-to-get visas for the United States. Then, and for many conferences that followed, ICWES organizers relied on the host country to help fund each event and also helped arrange for travel visas.

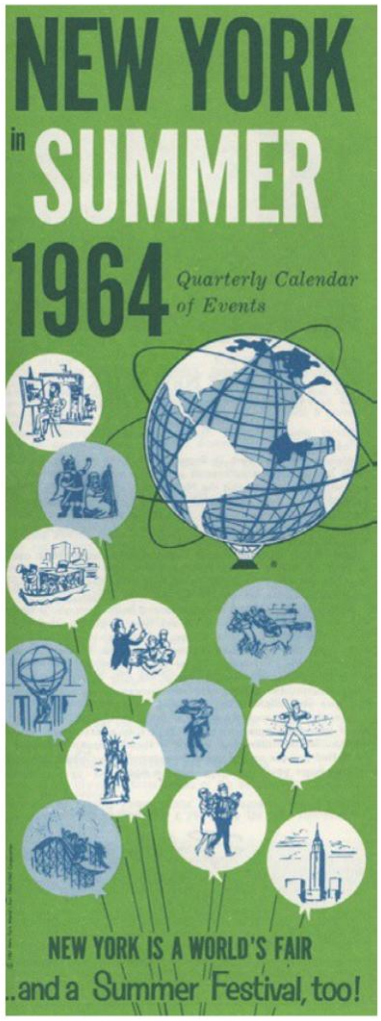
SWE obtained a $24,950 grant for the event from the National Science Foundation, as well as funds from industry, The Asia Foundation, and individual SWE members, according to SWE archival documents. A list of printing expenses showed that, of 16 items printed, the costs of 10 were donated, including 500 copies of the press kit, 600 copies of the conference directory, 600 copies of the banquet seating lists, and 12,000 copies of the preamble to the technical program. SWE committee members sent at least 31,00 pieces of mail to plan and publicize the event. The conference's gross expenses totaled $53,000.

SWE also did some impromptu fundraising at its membership meeting following the conference, according to the *SWE Newsletter*. Conference chair Ruth Shafer led an auction that raised more than $100 for SWE and "several hundred" for the next international conference.

"One delegate raised her own bid, and several contributed items for auction — including a lovely ring from Anna Amour (director of Rassegna Technica ENEL, Italy); coins from the Japanese and Indian delegates; dolls from the Bolivian delegate; an inlaid cigarette case from the Syrian delegate; and many more items," according to the newsletter account.

"I think it wasn't possible to do anything else (at that time)," said Sue Bird, who grew up in Coventry, England, and served as president of the U.K. Women's Engineering Society (WES) from 1991-1993. A veteran of many ICWES events as well as a past INWES president, Bird said, "We raised funds, and still do, to be able to bring women from developing countries to the conferences." Following the first conference, organizations volunteered to host each successive ICWES conference, essentially starting from scratch each time to invite delegates, put together funding, and plan the agenda. WES sponsored the second conference, held in 1967 in Cambridge, England.

The first conference succeeded in its goal of providing a global perspective on women in engineering: Reports revealed that 15 percent of the 150 engineering schools then in the United States had no women graduates, yet Norway reported that 10 percent of women there were engaged in engineering work, and countries in Central and South America were encouraged by more women becoming active in engineering and scientific professions. A separate archived report written by Veronica J.K. Milligan, an assistant district engineer at the South Wales Electricity Board, stated that 1.5 percent of engineers in Iran at that time were women; 5 percent in Turkey and 7.5 percent in Syria.



Global bonds

Just as important as the research and policymaking that the ICWES conference enabled were the relationships the women formed. Phillips said she found valuable mentors and gained practical skills from the early ICWES conferences, such as learning how to be more at ease making presentations. Now, Phillips is a mentor herself and hears how women entering the work force must still fight for acceptance. "There are still issues out there," she said, including the issue of whether women should stay home while

The first day of the conference, June 15, was declared Women Engineers' and Scientists' Day at the New York World's Fair. Conference attendees spent the day, which culminated in a parade of states and roll call of nations at the Federal Pavilion involving ICWES delegates from 35 countries and 47 U.S. states.

their children are young.

A number of women from SWE and other organizations attended ICWES meetings regularly. SWE Past President Isabelle French (see obituary on page 100), as well as other early SWE members now deceased, are on record as having attended at least the first nine events — meaning that for a period of nearly 30 years, these women supported the international exchange at the heart of the ICWES experience. For example, Lee Arnold and Lydia Pickup both attended the 1991 ICWES in Warwick, England, making it their ninth event. Also attending her ninth conference that year was Cicely Thompson from the U.K., who chaired ICWES 2, held in Cambridge, in 1967. A photo from the 1991 ICWES, submitted by Arnold, identified an international contingent that had, in Arnold's words, "attended numerous ICWES."

Kathleen Harer, P.E., F.SWE, served as SWE president in 1987-88. She recalled that her first journey outside of the United States was to the ICWES IV conference in 1975 in Krakow, Poland, where she was surprised at the freedom to take technical and cultural tours. The site was especially intriguing because Poland at that time was behind the Iron Curtain. "It was fascinating to meet engineers from other countries, and to learn how their experiences were the same and different from my own," Harer said. "I was invigorated by it."

Harer, who is retired from NASA, planned her vacations around the ICWES conferences, where she eventually gave presentations and made life-long friends. The experiences broadened Harer's view not only of the world, but of people in general. One particularly illuminating incident took place in 1999, when Harer's niece accompanied her to Japan.

There, Harer was impressed when the imperial princess of Japan, who opened ICWES 11 in Chiba, ordered a delay in her backdrop takedown so she could have a photo taken with Harer's 19-year-old niece. Both behaviors — the graciousness of the princess and her niece's confidence in making the request — gave her pause. "I couldn't imagine myself at age 19 asking to have my photo taken with the princess," Harer said. The only conferences Harer missed were because of the tremendous effort required to deal with the aftermath of the Space Shuttle Challenger explosion.

Bird was amazed by the stories women from other parts of the world would tell. She remembers one ICWES participant from a troubled African country who was not just pleased to be at the meeting, but happy to be alive amid her country's chaos.

"It brings everything into context sometimes," Bird said. "All of a sudden, you have friends from all over the world. I met such great people, I kept on with it."

Bird, who with her husband, Peter, ran an acoustics consultancy, bemoans that there are times she attends ICWES conferences where she hears stories of discrimination and gender bias, and thinks to herself, "I've heard this so many times. When is this going to change?" she said.

Although there is still much work to be done in these areas, Bird said she is encouraged by the young women who are becoming leaders, and realizes a lot has changed.

Ensuring continuity

As successful as the ICWES conferences have been, a group of women decided in 2001 that a steady networking infrastructure needed to be developed to undergird the far-flung conference efforts. After all, the small group of women who had started ICWES were getting older, a few of the founders had died, and those left continued to cobble together from scratch global conferences once every three years.

Monique Frize, Ph.D., a faculty member at the University of Ottawa and the first woman to earn an engineering degree from that school, proposed the network. The recommendation won unanimous support from the ICWES business meeting in which a representative from every member country voted.

"We decided (ICWES) had to have an organization with an address and with continuity," said Dr. Frize, who was elected the network's first president for the 2005-2008 term. The network's name — the International Network of Women Engineers and Scientists (INWES) — came to her while traveling to meet SWE's then-president, Gail Mattson, P.E., F.SWE, to finalize INWES' mandate and mode of operation. Indeed, Dr. Frize credits SWE with providing the necessary moral and financial support to help start INWES.

The INWES founders included Frize, Mattson, Bird, Suzanne Brainard, Ph.D., and Claire Deschênes, Ph.D. Bird served as INWES president from 2008-2011.

INWES is continuing the SWE

and ICWES tradition by serving as a facilitator of regional meetings, where women share their stories and promote one another's successes, said current INWES President Kong-Joo Lee, Ph.D., a biochemist and a professor at the Ewha Womans University College of Pharmacy and Graduate School of Pharmaceutical Sciences in Seoul, South Korea. Dr. Lee earned her Ph.D. in chemistry from Stanford University in Palo Alto, California.

Mattson, SWE past president and a SWE Fellow, was impressed by her first ICWES conference in 2002 in Ottawa, and immediately saw the potential for SWE to share "best practices" with women throughout the world. "Most companies have realized that women engineers really make a difference," she said. "They bring a whole different skill set to working on projects and task teams. That's why corporate sponsors and recruiters have such a big turnout at SWE conferences. I think they are finally realizing that overseas, too, especially in developing countries." ■

From ICWES to INWES *By Sandra Guy*

Monique Frize, Ph.D.
Canada

Claire Deschênes, Ph.D.
Canada

Anna Szemik-Hojniak, Ph.D.
Poland

Kong-Joo Lee, Ph.D.
current INWES President
Korea

Uduakobong Okon
Nigeria

Joan Graf, F.SWE
United States

The 1964 debut of the International Conference of Women Engineers and Scientists (ICWES) proved what its SWE organizers set out to do: Create a living, breathing movement that women throughout the world look to for inspiration today. Indeed, ensuring ICWES' future led SWE's leaders and their international counterparts to set up a networking structure called the International Network of Women Engineers and Scientists (INWES).

The network idea emerged from the realization in 2001 that ICWES was "getting very fragile" and needed a sturdy construction that guaranteed continuity, said Monique Frize, Ph.D., the University of Ottawa professor who served as the first INWES president from 2005-2008. Dr. Frize initially thought that INWES should last only 30 years, and then no longer be needed because ICWES would be such a strong organization on its own accord.

INWES President Kong-Joo Lee, Ph.D., a biochemist and a professor at the Ewha Womans University College of Pharmacy and Graduate School of Pharmaceutical Sciences, in Seoul, South Korea, says INWES and The Association of Korean Woman Scientists and Engineers (www.kwse.or.kr) have supported each other in their work to enhance women's rights.

Dr. Lee was one of the founders of KWSE in 1993. She was among a group of professional women — many of whom worked in the Daejeon (Korea) Science Research Park — who created a network among women in science and engineering. Together, they worked to start a day care center there, promoted science and technology classes in local schools, initiated affirmative action to support and promote women in science, technology, engineering, and mathematics (STEM) fields, and advocated for an employment quota system for women to be employed in STEM positions in the public sector, including public universities and research institutes.

In 2011, KWSE started to organize a regional network under the INWES umbrella — the Asia and Pacific Nation Network (APNN) — and encouraged other regions to do the same. The APNN, who are all INWES members, comprises Korea, Japan, Taiwan, Malaysia, India, Sri Lanka, Australia, Mongolia, New Zealand, Nepal, Pakistan, and Vietnam.

Anna Szemik-Hojniak, Ph.D., a chemistry professor at the University of Wroclaw, Poland, rose from small-town beginnings to study under Nobel-winning scientists, and master subjects such as radiochemistry and molecular photophysics. Dr. Szemik-Hojniak said she was "nicely surprised" to see so many women at the ICWES 10 conference in Budapest in 1996 discuss issues such as discrimination, exclusions, women's careers, human rights, labor codes, women's underrepresentation on the higher rungs of the academic ladder, and related issues.

"What does this (50th ICWES) anniversary mean?" Dr. Szemik-Hojniak said. "It is a victory! In this case, it is the victory of educated women in receiving their own fair rights, the victory of tolerance over chauvinism, reason over stupidity, and, finally, respect for women over their disregard for centuries."

Uduakobong Okon, a member of the INWES board of directors and president of OPAGESTE (Organization for Promoting African Girls in Engineering, Science and Technology Education) in Nigeria, was equally enthusiastic in her description, via email, of the 50th anniversary.

"It's exciting to realize these efforts, such as the INWES Education and Research Institute, in transcending generations and stretching toward the youths and younger women in their educational development," she said. "Indeed, a solid foundation is laid for building a better future for all of STEM."

Claire Deschênes, Ph.D., a professor in mechanical engineering at Université Laval in Quebec City, Canada, and treasurer of the INWES Education and Research Institute, said she is energized when she attends SWE and ICWES conferences because she meets so many interesting women and learns from the problems they encounter and the solutions they create.

Those conversations offer Dr. Deschênes new research insights and ideas on how to reach out to young women and retain the women already in STEM disciplines, she said.

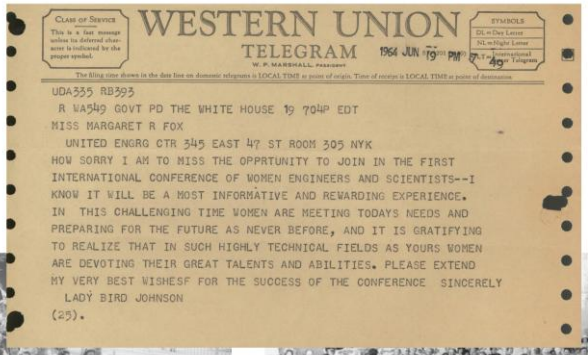
Joan Graf, SWE Fellow, INWES treasurer, and an IT manager at telecom company CenturyLink, learned of INWES when she lived in Denver and was asked to be the group's treasurer. Graf said she was excited to meet women from throughout the world and learn more about other cultures.

Graf noticed that women in some other countries concentrated on activities that encouraged young girls to work together and gain self-esteem. "It's interesting to see that these women's groups realize the girls need self-esteem work first," she said. Graf hopes to see communications improve among women throughout the world, including in countries with limited Internet access, and to improve the still-disappointing behavior that many men show toward tech-savvy women. "That is why the conferences are so valuable. It's exciting for people to see where others have made headway regarding these issues — in addition to the technical topics discussed," she said.

An ICWES Photo Album

From the first International Conference of Women Engineers and Scientists held in 1964, through successive gatherings held over the decades, women from throughout the world have come together approximately every three years to network and share research, insights, and best practices.

I New York City **1964**



WESTERN UNION
TELEGRAM

1964 JUN 19 PM 7:47

UDA335 RB393
R WA549 GOVT PD THE WHITE HOUSE 19 704P EDT
MISS MARGARET R FOX
UNITED ENGRG CTR 345 EAST 47 ST ROOM 305 NYK
HOW SORRY I AM TO MISS THE OPPRTUNITY TO JOIN IN THE FIRST INTERNATIONAL CONFERENCE OF WOMEN ENGINEERS AND SCIENTISTS--I KNOW IT WILL BE A MOST INFORMATIVE AND REWARDING EXPERIENCE. IN THIS CHALLENGING TIME WOMEN ARE MEETING TODAYS NEEDS AND PREPARING FOR THE FUTURE AS NEVER BEFORE, AND IT IS GRATIFYING TO REALIZE THAT IN SUCH HIGHLY TECHNICAL FIELDS AS YOURS WOMEN ARE DEVOTING THEIR GREAT TALENTS AND ABILITIES. PLEASE EXTEND MY VERY BEST WISHESF FOR THE SUCCESS OF THE CONFERENCE SINCERELY
LADY BIRD JOHNSON
(25).

TOP: The first lady of the United States, Claudia Taylor Johnson, better known as Lady Bird Johnson, sent a telegram to the conference organizers with her best wishes for the success of the first ICWES.

BOTTOM LEFT: Standing on the steps of the World's Fair Federal Pavilion, ICWES participants gathered for the parade of states representatives.

BOTTOM RIGHT: The Belmont Plaza Hotel was the venue for the formal banquet capping the event.

II Cambridge, England **1967**

RIGHT: Session attendees listen to interpreters via headphones at ICWES II. First row, left, is Isabelle French, SWE past president. Fourth row, second from right, Elsie Eaves. Fifth row, from right, Rear Admiral Grace Murray Hopper, author of COBALT, in a rare photo out of uniform. Next to Hopper are SWE's Mary Munger and Lydia Pickup.

FAR RIGHT: From left, Ruby Langford, Dorothy Morris, and Morris' husband, Bob Morris, attend a session. Bob Morris was a member of SWE's Men's Auxiliary in the years preceding male membership.

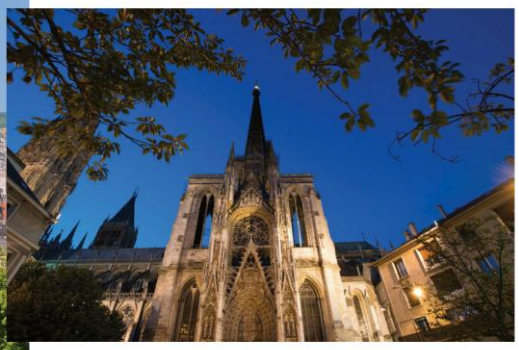
III Turin, Italy **1971**

TOP LEFT: Attendees gather for a group photo.
TOP CENTER: A British delegate, left, and Mahin Rahmani from Iran review the conference program.
TOP RIGHT: Group of attendees with Anna Amour, second from right, one of the conference organizers.
BOTTOM LEFT: The Society's Executive Secretary, Winifred "Winnie" White, poses with police guards at an automobile museum.
BOTTOM RIGHT: Sharing a moment, from left, an unknown attendee, with Lydia Pickup and Carolyn Phillips, both from SWE, and May Maple from the U.K.'s Women's Engineering Society.

IV Krakow, Poland **1975**

TOP: "J.K." watches as Dr. Anno of Japan speaks during the fourth ICWES.
CENTER: A group poses for a commemorative photo during one of the conference tours.
RIGHT: Conversation with women engineers and scientists from Great Britain, Malaysia, the Netherlands, and the United States. SWE's Carolyn Phillips is on the far right.

V Rouen, France **1978**



Rouen, France, was the site of the fifth ICWES. While there is little documentation available on the event, one of the known highlights was a tour that included the extensive facilities of the Rouen Port Authority.

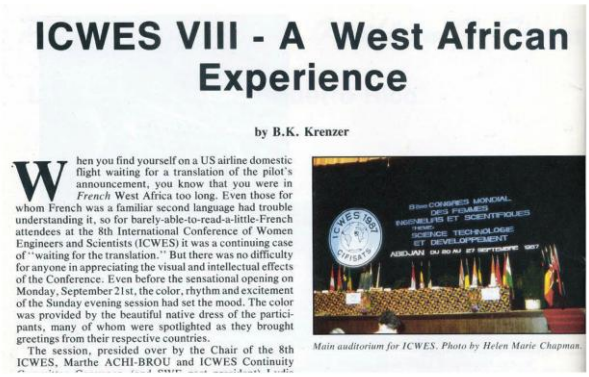
VI Bombay, India 1981

LEFT: From left, program chair K. Ranadive, chair emerita Nicole Becarud of France, and ICWES chair Dr. Sumate Bhide at ICWES VI in Bombay.
ABOVE: Enjoying the opportunity to network with women from many countries were, from right to left, Dormer Ellis of Canada; Isabel Hardwich; an unnamed delegate from France; Lydia Pickup from SWE; and other delegates.

VII Washington, D.C., United States 1984

ABOVE: Meeting and conducting dialogue with women engineers and scientists from throughout the world is a high point of the ICWES conferences.
ABOVE RIGHT: From left, Anna Amour of Italy, an unknown delegate, Jacqueline Juillard from Switzerland, and Mahin Rahmani from Iran, enjoy a session.
RIGHT: A professor, center, from Ain Shams University in Egypt speaks with attendees during one of the receptions at the seventh ICWES conference, held in Washington, D.C., United States.

VIII Abidjan, Ivory Coast 1987



ICWES VIII - A West African Experience

by B.K. Krenzer

When you find yourself on a US airline domestic flight waiting for a translation of the pilot's announcement, you know that you were in *French* West Africa too long. Even those for whom French was a familiar second language had trouble understanding it, so for barely-able-to-read-a-little-French attendees at the 8th International Conference of Women Engineers and Scientists (ICWES) it was a continuing case of "waiting for the translation." But there was no difficulty for anyone in appreciating the visual and intellectual effects of the Conference. Even before the sensational opening on Monday, September 21st, the color, rhythm and excitement of the Sunday evening session had set the mood. The color was provided by the beautiful native dress of the participants, many of whom were spotlighted as they brought greetings from their respective countries.

The session, presided over by the Chair of the 8th ICWES, Marthe ACHI-BROU and ICWES Continuity

Main auditorium for ICWES. Photo by Helen Marie Chapman.

LEFT: Bette K. "B.K." Krenzer was the Society's president from 1986-87. She and a contingent of SWE members attended the eighth conference in Abidjan, where the president of Côte d'Ivoire officially opened the event. Krenzer reported on the experience in *U.S. Woman Engineer,* the forerunner of *SWE Magazine.* She noted that in addition to the rich cultural experience, an outcome of the gathering was the adoption of final resolutions. These included recommendations on how to encourage women to become engineers and scientists; how to increase women's involvement in developing new technologies; and how to achieve equal rights for women in professional fields.

IX Warwick, England **1991**

ABOVE LEFT: From left, SWE's Jo Webb, Betty Preece, Margaret Pritchard, and Elayne Brower, with May Maple of the Women's Engineering Society, U.K. The delegates behind them are not identified.
ABOVE RIGHT: During ICWES IX, a group of colleagues who had attended numerous ICWES conferences over the years posed for a photo. From left, Jaqueline Juillard, Switzerland; Lydia Pickup, U.S.A., had attended all nine conferences; Elizabeth Laverick, U.K., chair of ICWES IX; May Maple, U.K.; Paula Talpaert, Belgium; Mary Munger, U.S.A.; Lee Arnold, U.S.A., had attended all nine; Dormer Ellis, Canada; Mahin Rahmani, Iran; Cicely Thompson, U.K., had attended all nine and served as chair of ICWES II in 1967, held in Cambridge.

10 Budapest, Hungary **1996**

With the 10th conference, organizers moved away from Roman numerals as the numeric identifier.
FAR LEFT: Held in Budapest, Hungary, tours for ICWES 10 included a trip to the historic village of Szentendre, now an artists colony, which offered traditional cuisine, music, and folk dancing.
LEFT: Among the SWE members attending were: Peggy Layne, SWE president from 1996-97, back row, left; SWE past presidents Kathryn Cunningham, second from left, middle row; and Kathleen Harer, middle row, left end.

11 Chiba, Japan **1999**

LEFT AND ABOVE: The conference programming included time to experience aspects of traditional culture, from temples to Kabuki theater.
RIGHT: Masako, Crown Princess of Japan, conducted the opening ceremony of ICWES 11.

12 Ottawa, Canada **2002**

TOP LEFT: Held in scenic Ottawa, Canada's capital city, there was a large SWE presence at ICWES 12. **TOP RIGHT**: Longtime SWE member LeEarl Bryant, serving as the first woman president of IEEE-USA, hosted a reception during the conference. With the IEEE-USA bag in hand, Bryant stands with SWE friends. **ABOVE:** A dozen former SWE presidents attended, along with current (2002) President Rachel McQuillen, back row, left. Next to McQuillen: Peggy Layne, Jaclyn Spear, Carolyn Phillips, Gail Mattson, Roberta Gleiter, and Kathryn Cunningham. Front row, from left: Gloria Montano, Anna Salguero, Isabelle French, and Kathleen Harer. Not shown but completing the dozen was past president Shelley Wolff.

13 Seoul, Korea **2005**

Held August 26-29 at Ewha Womans University in Seoul, the theme of ICWES 13 was "Women Engineers and Scientists: Main Force to Reshape the Future World."
LEFT: In addition to sessions and scientific/technical exhibits, tours to historic sites enhanced the experience.
ABOVE: From left, Jane Zimmer Daniels; Betty Shanahan, then executive director and CEO of the Society; and SWE Past President Gail Mattson were among the SWE contingent attending.

14 Lille, France **2008**

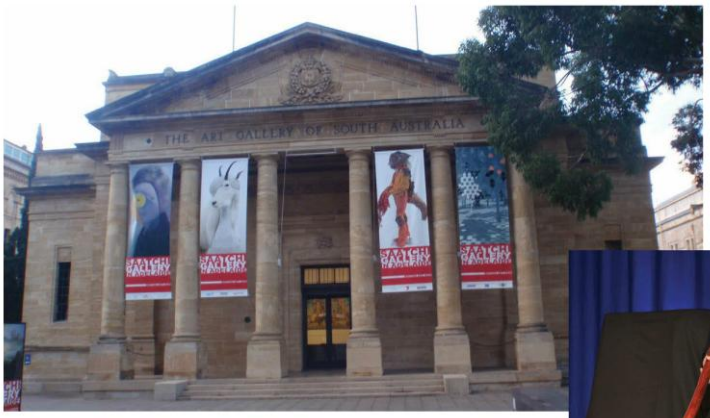

Strategies to attract Girls into STEM

An Innovative Model:
The North Alabama Girl Scouts Engineering Day

Lisa Brunegraff
Society of Women Engineers

LEFT: SWE member Lisa Brunegraff received a best poster award for her entry, "Strategies to attract girls into STEM." She attended the conference with her daughter, Keavy Nenninger, who at the time was an aerospace engineering major at St. Louis University and served as a student volunteer at the conference.
ABOVE: Women from the United States and Africa welcomed the opportunity to make connections.
ABOVE RIGHT: Sharing a moment together, from left, Virginia Counts, SWE president 2008-2009; her mother, Doris Berry; Karen Horting, then SWE deputy executive director; Gail Mattson, SWE past president, then INWES treasurer; and Rita Sevo from the U.S.

15 Adelaide, Australia **2011**



ABOVE LEFT: The Art Gallery of South Australia was an impressive venue for the opening of ICWES 15, held in Adelaide, with a focus on leadership, innovation, and sustainability.
ABOVE CENTER AND RIGHT: The long notes of the didgeridoo filled the hall at the unveiling of the painting, above right, which was a collaborative dot painting in aboriginal style, made by participants over the course of the conference.
LEFT: SWE President Elect Alyse Stofer, Jan Williams, Anne Perusek, Gail Mattson, Peggy Layne, and Karen Ramsey-Idem were among the SWE contingent. At the closing ceremony, Stofer invited everyone to ICWES 16 in Los Angeles, to be held jointly with SWE at the Society's annual conference.

16 Los Angeles, California **2014**

WE14 The Annual Conference for Women Engineers +ICWES 16

A GLOBAL EXCHANGE FOR CHANGE [October 23 - 25, 2014] Los Angeles, California

The upcoming WE14 and ICWES16 conference will be "A Global Exchange for Change."

INWES Milestones

In the 12 years since its formation, the International Network of Women Engineers and Scientists has taken decisive steps to fulfill its mission.

By Monique Frize, Ph.D., and Claire Deschênes, Ph.D.

In December 2013, members of the INWES board and guests met at the Korea Institute of Science and Technology - Europe, located in Saarbrücken, Germany.

Several factors fostered the creation of the International Network of Women Engineers and Scientists (INWES) in 2002. The main consideration was the existence of an informal network of women who ensured the organization of the International Conference of Women Engineers and Scientists (ICWES), which has taken place approximately every three years since 1964. This network had no specific address or structure. To ensure the successful continuation of this activity, many women felt that some formalization was needed at this stage.

In addition, UNESCO and its Canadian Commission were concerned about the low participation of women in science and engineering. In the 1990s, Monique Frize, Ph.D., was a member of the Science subcommission at the Canadian Commission for UNESCO, and Claire Deschênes, Ph.D., under the initiative of the Canadian Commission for UNESCO, acted as a member of the scientific committee for the European preparatory event to the World Conference on Science (WCS) held in Bled, Slovenia, in 1998. Dr. Deschênes also joined the Canadian delegation at the WCS in Budapest in 1999, where the "Declaration on Science and the Use of Scientific Knowledge" was adopted. A section of this document reads: "That access to scientific knowledge for peaceful purposes from a very early age is part of the right to education belonging to all men and women, and that science education is essential for human development, for creating endogenous scientific capacity and for having active and informed citizens." Paragraph 90 specifically recommended the creation of an international network of women in science, technology, engineering, and mathematics (STEM).

The creation of INWES was a response to this call. To develop the network, Drs. Frize and Deschênes, and Moyra McDill, Ph.D., invited a group of women involved with ICWES and other potential partnering organizations to a meeting in Merrickville, Canada, in 2001. This meeting was funded by grants from UNESCO and the Canadian Commission for UNESCO.

Attendees were: Aba Andam, Nigeria; Sue Bird and Nicole Rockliff, Ph.D., U.K.; Gloria Bonder, Argentina; Suzanne Brainard, Ph.D., Catherine Didion, Kathleen Harer, P.E., and Gail Mattson, P.E., United States; Renée Clair and Marianne Rodot, France; Mitsuko Kazuno, Ph.D., Japan; Efstratia Zafeiriou, Germany; Claire Deschênes, Ph.D., Colleen Ennett, Ph.D., Hiromi Matsui, Moyra McDill, Ph.D., Eva Rathgeber, Ph.D., and Gisèle Trubey, UNESCO; and Monique Frize, Ph.D., Canada. The vote to create INWES was unanimous. The next step was to present this plan at the ICWES12 business meeting for a formal adoption.

In 2002, during the business meeting at ICWES12 in Ottawa, it was proposed that INWES be created to replace the informal committee; the vote in favor was unanimous. An interim board was elected for three years (2002-2005).

Defining the mission and means

The mission statement defined INWES as an international network focused on supporting women in STEM (science, technology, engineering and mathematics). It was established to:

"Strengthen the capacity of individuals, organisations, and corporations through education and professional development and encourage their increased participation in Science, Technology, Engineering, and Mathematics (STEM) worldwide through an international network of organisations and experts."

Goal: "Build a better future worldwide through the full and effective participation of women and girls in all

The INWES Education and Research Institute (ERI)

In 2007, the three founding members of INWES incorporated the INWES Education and Research Institute (ERI) in Canada, and the institute became a charity organization in 2008. The ERI is a separate organization founded in order to better achieve objectives with regard to funding education in science, technology, engineering, and mathematics (STEM) and to meet the charity status laws of Canada.

The institute became registered as a not-for-profit 501c3 organization through reciprocity by the United States of America Internal Revenue Service in March 2010. The ERI is governed by a board of directors, and activities are planned and administered through committees that include programs, finance, and communications.

The objectives of the institute are to advance education in STEM fields through the following programs:

- Awarding scholarships, bursaries, and grants for students wishing to study in one of these fields
- Carrying out research in both developed and developing countries concerning the fields of science, technology, engineering, and mathematics, as both an educational and career choice and to make the results of that research available to the interested public
- Acting as a resource center and database for information concerning education in these fields and collecting best practices in encouraging students to stay in school through college and university
- Developing and maintaining a website to raise public awareness concerning these fields of study and to make the results of research available to the interested public

aspects of STEM."

Long-term objectives:

- Participate in reaching the United Nations Millennium Goal No. 4: "to promote gender equality and work towards the education of girls and women in all nations, but especially in countries where the disparity between boys and girls is largest."
- Contribute to the economic and social development of countries in transition and developing countries through the full participation of women in STEM.
- Reach a critical mass of women in STEM worldwide.
- Respond to the current need of human resources in STEM and capacity building in STEM fields.
- Reverse the decreasing trend in the number of women entering ICT (information and communications technology) or STEM that western countries have experienced since the turn of the millennium.

Organization and Structure

INWES was incorporated in Canada as a nonprofit, nongovernmental organization (NGO) in April 2003. Originally, three categories of members were defined: associations of women in STEM, corporate members, and individual members for areas of the world where there were no relevant associations.

INWES is run by an elected board of up to 18 directors, of which 12 are from organizational members, three each from corporate members, and three from individual members. The three founding members were Drs. Frize and Deschênes, with Gail Mattson. The election of the first formal board of directors took place in 2005 at ICWES13 in South Korea.

The board of directors generally meets face-to-face at least once a year and holds regular email and virtual conference meetings. The first president was Monique Frize (2005-2008). The second president was Sue Bird (2008-2011), past president of the Women's Engineering Society (WES) in the U.K. She was involved in the organization of ICWES9, and in the formation of INWES. Kong-Joo Lee, Ph.D., is the current INWES president, serving from 2011-2014. A former president of the Association of Korean Woman Scientists and Engineers (KWSE), Dr. Lee was organizing committee chair of ICWES13.

General meetings are held virtually in interim years, and in person at ICWES conferences. INWES is an inclusive multinational organization with 11 geographical regions represented:

- North America
- South and Central America, and the Caribbean
- Western Europe, including Israel and Turkey
- Eastern Europe
- French-speaking Africa
- English-speaking Africa
- Middle East
- Central Asia, including India
- Southeast Asia
- Far East Asia
- Australia and New Zealand

INWES Activities

INWES participates in international economic and social development in the following four ways:

- Disseminates information among INWES members and in civil society
- Fifteen ICWES triennial conferences have been held since 1964, providing continuity and communication
- INWES works with host organization/country on logistics, announcements, publicity
- provides support letters for visas and fundraising

In addition, regional events are held in years between the main triennial conferences whenever possible. The main purpose of regional conferences is to encourage regional participation of women in STEM and connect them to INWES. The workshops are expected to produce long-term outcomes of collaboration, networking, and a staging platform for future initiatives. Connections can be established in areas where women have been more isolated, or have not had much interaction with the network in the past. Such regional meetings have been held in Daejon, Korea, 2003; Nairobi, Kenya, 2004 and 2013;

Wroclaw, Poland, 2007; Busan, Korea, 2009; Washington, D.C., U.S.A., 2010; and New Delhi, India, 2012.

Aside from meetings, INWES provides an excellent forum for the exchange of best practices to encourage girls into science and engineering careers. For example, several best practices coming from different members' countries have been shared through INWES newsletters and during the ICWES conferences and regional workshops.

INWES Goal: "Build a better future worldwide through the full and effective participation of women and girls in all aspects of STEM."

INWES fosters the development of associations of women in STEM. To accomplish this, INWES can provide seed money to help create the association through an application and competition process. INWES offers a manual on how to start such an association, and requests annual reports on progress for a period of three years.

INWES encouraged the creation of the following new organizations:

- 2002, in Pakistan, initiator Durdana Habib, INWES director, and Nageen Ainuddin, INWES member
- 2004 in India, initiator Suriya Thevar, Ph.D., INWES director
- 2006 in Zambia, initiator Agnes Mofya, INWES member

In 2009, a regional affiliation of INWES — the Asia and Pacific Nation Network (APNN) — was established in Busan, Korea, to serve as a platform for Asian women scientists, to exchange information among Asian women scientists organizations, develop policies, and assess the current situation in every member country. To strengthen the connection among Asian women scientists, the APNN meeting is held in a different member country each year and publishes post-conference reports. The first APNN meeting was held in Adelaide, Australia, in 2011, and the second one convened in Kuala Lumpur, Malaysia, in 2012. The third was in Taiwan in 2013, with the most recent meeting held in Korea earlier in 2014.

The proposed African Network held a meeting in 2009 in Abidjan, Ivory Coast, where a network structure was proposed. Ongoing discussions with the INWES board are in process to finalize an appropriate structure.

The INWES general secretary worked with members of the Arab Science and Technology Foundation, for the setting up of an Arab network. A European network is currently under review.

WISE India was established in 2010, and is now a member of INWES; it hosted the regional meeting in Delhi in 2012.

Conclusion

The 50th anniversary of ICWES conferences will be celebrated this Oct. 23-25 in Los Angeles at the combined Society of Women Engineers annual conference, called WE14, and the ICWES 16 gathering. The theme of the event is "A Global Exchange for Change."

At the end of 2011, following the ICWES15 gathering in Adelaide, Australia, INWES represented more than 200,000 women through 25 organizations of women in science and engineering, spread across 11 geographical areas of the world. INWES collaboration with existing international, regional, and local organizations aims at reinforcing human and institutional capacities, at promoting science and engineering for young people, and facilitating the access to science and technology for all women in the world. For more information, visit: www.inwes.org and www.inwes-eri.org. ■

Participation at International and Regional Meetings

- INWES participated in the writing of UNESCO's *International Report on Science, Technology, and Gender,* led by Eduardo Martinez-Garcia, Ph.D. (IRSTG 2005). (M. Frize, C. Deschênes).
- Organisation for Economic Co-operation and Development OECD workshops on women and science (C. Deschênes in Nov. 2005, Paris; C. Deschênes, M. Frize, and M. Gratton in Sept. 2006 in Ottawa).
- Launch of the Arab network of women scientists and engineers (Bahrain, Feb. 2005) (S. Bird represented INWES).
- INWES entered in relations of the *operational* type with UNESCO in 2008. With UNESCO changes in categories in 2012, INWES is now listed under consultative status.
- Attendance at the 35th session of the General UNESCO Conference in 2009 and all the meetings of the NGO liaison committee. Representatives of INWES attended the L'Oreal-UNESCO awards in 2010 and 2011 for Women and Science, and the ceremony for the L'Oreal-UNESCO International Fellowship holders.
- UNESCO patronage and financial support was received for delegates from developing countries to attend ICWES14, ICWES15, and for the regional meeting in Nairobi, Kenya, in 2013.
- L'Oreal-UNESCO laureates were welcomed at ICWES conferences, and the head of the Division and Department for Natural Science also took part. The assistant director-general, Gretchen Kalonji, Ph.D., attended ICWES15 as a plenary speaker.
- INWES contributed to the Engineering Report of the Natural Sciences Department.
- INWES developed relations with UNESCO National Commissions in some countries, and received their support for several events.
- INWES members have taken part in conferences and workshops organized by the World Federation of Engineering Organizations (WFEO) and helped to organize some events. These events have taken place in Tunisia, Argentina, Brazil, and Switzerland, among others. INWES has a memorandum of understanding with the women in engineering committee of the WFEO. Monique Frize represented INWES at meetings of the WFEO capacity building committee for poverty eradication in Washington in 2004 and Puerto Rico in 2006. I. Gueye, Frize, M. Moutaud, and Y. Ramos represented INWES in Tunis, Tunisia, at the WFEO conference on women in engineering in 2007.