

**IMPACT OF GENDER/SEX ON INNOVATION AND NOVEL TECHNOLOGIES
(iGIANT™)**

COMMERCIAL SPACE ROUNDTABLE

MCDERMOTT WILL AND EMERY

WASHINGTON, DC

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Welcome:

Saralyn Mark, MD (iGIANT President and Founder): Described the mission, goals and history of the impact of Gender/Sex on Innovation and Novel Technologies (iGIANT™) program and its roundtables.

She thanked McDermott, Will and Emery, LLC and attorney, Shelby Buettner, for hosting the roundtable, and for graciously providing the resources and expertise to evolve the iGIANT from a concept to a non-profit; and Dr. Eliza Chin, Executive Director of the American Medical Women's Association (AMWA) for invaluable championship and logistic support, co-hosting roundtables across the country. Dr. Mark also thanked Chris Carberry, CEO of Explore Mars, Inc. and George Sifakis, CEO of Ideagen, as iGIANT champions.

Dr. Mark noted that the health care sector and related industries have been at the forefront of incorporating gender/sex into design elements and this is just the beginning. It is often difficult to forge public private partnerships, due to real or perceived restrictions, yet the iGIANT roundtables have been well received as a tool for bringing together many sectors. She said that this is the 15th roundtable, and there are all ready outcomes including iGIANT champions such as Boston Scientific revising R & D policies and protocols, new medical and engineering school curricula incorporating gender/sex and educational symposia simulcasts affiliated with the White House Conference on Women and Girls. She then highlighted four upcoming iGIANT events in 2016 including an iGIANT 2.0 roundtable on the Fox Studio movie lot as part of the Raw Science TV film festival in LA in December.

Introduction:

We all are ambassadors for the iGIANT, stated Dr. Mark. Even though this is a Commercial Space roundtable, not everyone here is from the commercial space world, which she said makes for important cross pollination between sectors. " During the next few hours we will have a working meeting in which we will take action steps, raise awareness of specific

gender/sex issues, establish a common lexicon, and empower each of you to take information back to your sectors. Most importantly, we are creating a network to make changes to improve quality of life for men and women". Dr. Mark gave examples from the August NASA iGIANT roundtable that included female astronauts and pilots suffering from physical, emotional and spiritual harm just trying to do their jobs without the right equipment. She said, "As we discuss the lay of the land for where we need to go, I want you to think about how to take messages back to your workplaces and respective sectors".

Roundtable Presentations:

Jill Mueller (Assistant Director, Office of Legislative Affairs at Department of Homeland Security) has operated in the congressional relations world for years, and formed a government and commercial women's network twelve years ago, and wants to bring iGIANT info back to this network as it speaks to women in many different fields and occupations. Jill is also hosting next month's roundtable at Ideagen.

George Sifakis (CEO Ideagen) said that iGIANT brings an important cross section of public and private sectors together, as does Ideagen, to discuss and work on gender/sex issues. Both men and women have to be at the table to empower women and girls, as in Ideagen's July 2016 UN summit where Dr. Mark discussed the iGIANT.

Peggy Wu (Senior Research Scientist for Smart Information Flow Technologies (SIFT) (PLEASE SEND THIS PARAGRAPH TO PEGGY TO EDIT—I DON'T UNDERSTAND IT AND WANT IT TO BE CORRECT) has consulted for computer science engineering and psychology, and was hired in 2003 to teach young soldiers the impact of social dynamics.. She said that with her background in psychology, gender/sex has many implications in the design of GPS and other warning systems. In 2007, she worked with Air Force research lab which studied gender social distance, power difference and the gender of computer user/agent. **Even if the text content was same for males and female computer agents when from female (indicated only by icon) compliance lower, slower response???** **Implication for design for warning systems.** When creating virtual agents to teach young soldiers social dynamics, studies found that when a female virtual agent was used, the response was slower and it was felt to be less polite. Currently, she is doing studies funded by NASA which examines Mars exploration and sensory monotony and living without significant human interaction as well as developing virtual reality systems to augment negative impacts of isolation. Gender has not been a key focus of that research. The Hawaii study with 6 subjects is 2017 now being analyzed and findings will be announced in January. She concluded by saying that there needs to be many more studies evaluating the impact of gender/sex.

Dr. Mark remarked that similar anecdotal evidence of different responses to virtual voices was brought up in the August 2016 NASA roundtable regarding communication systems in military vehicles such as tanks.

Dr. Keith Salzman (Chief Medical Information Officer for IBM, COL(ret) US Army) reviewed IBM's history of working with women: hired first African Americans and women at the beginning of the 20th century, recruited first female professional in 1934, in 1935 Thomas Watson wrote first equal rights policy, in 1943 first woman was selected as Vice President, in 2006, a woman won the prestigious Turing award. IBM has a long history of inclusion of women in management. The first female CEO appointed with several women on the Board of Directors in 2012. Two thirds of women employees are mothers. IBM was cited as Working Woman magazine as the top company for working women of color. He said there are groups in IBM for sub-segments of workforce such as women and veterans. He provided documents which highlighted IBM's accomplishments and how it can be an example to others. He discussed gender equity and diversity in workplace and how to capitalize on that so that technology benefits both genders;" hand in glove" – gender equality needs to ensure that technology is being developed that meets needs of men and women to help address the fact that women may self-select out of certain occupations because appropriate tools are not available.

He shared his background as a former military family physician who ran a hospital in Iraq who was interested in clinical informatics which led him to IBM. He is helping build to an IBM and Federal record information system.

Dr. Mark added that to successfully retrofit an existing system is very difficult. iGIANT is aimed at impacting current and future design initiatives.

Roberta Biegel (President, RB Strategies and iGIANT board member) discussed her background working on many social and health-related issues on Capitol Hill; working to include women in clinical trials and ensure that drugs are also tested in women. She also worked for the Society for Women's Health Research. While there, she worked on a report studying whether sex and gender matter in healthcare, and research. She commented that there is much to be done through legislation and regulations.

Shelby Buettner (Attorney, McDermott, Will & Emery) described her background managing biomedical development projects with the US Department of Defense and NASA, and conducting research with the United Nations Environmental Program. While she was working on global environmental impact programs, she became more conscious of the need to consider public health aspects when crafting legislation. She is interested in including impact assessments as they pertain to gender and sex. She now advises clients on clinical trials and business strategies for drugs and devices and admitted that we don't usually talk about gender or sex; however, it needs to happen.

Dr. Mark added that we need to talk more about policies and legislation, for example, the wisdom of encouraging or mandating FDA to include sex and gender in clinical trials and product approvals.

Catherine “Cady” Coleman (PhD, Astronaut, National Aeronautics and Space Administration (NASA)) gave an overview of her career as an astronaut since 1992 including two shuttle missions and one six-month space station tour. She now works within the NASA Chief Technology Office to turn her experiences into advances which help with training and preparing astronauts for missions. She is thrilled to have the opportunity to participate in the space programs as an astronaut, but the equipment challenges were significant. This issue was faced not only for women but also for smaller men. Her space suit was not designed specifically for her. Although she performed several extra-vehicular activities (EVAs) or space walks, she had to wear a space suit that was way too big and said it was like “dealing with a big air bubble in your suit almost like a big exercise ball. This is what it’s like for a smaller person in a large space suit”. When NASA eliminated small suits for budgetary reasons, many female astronauts could not succeed at the space walking testing because of improper equipment. Some of female astronauts were able to succeed using foam padding, but that’s not the solution. In the International Space Station (ISS) or on a journey to Mars, how do we mitigate the things like padding? In the future, we can’t afford to lose women and diversity because of lack of gender and sex in technical aspects”. She commented that we should watch veteran astronaut, Peggy Whitson, who is on her way to the ISS for her third mission. “She is so good, so fast--hallways at the NASA training facility are adorned with “Superman wears Peggy Whitson pajamas” posters. We can’t afford to lose anyone from our team”.

Went on a space shuttle mission – everyone wants to do the space walking. I was proud to be the third back-up but this has raised awareness at NASA: we need to figure out how I can do better because they depended on me. We can’t afford to lose these people – especially when we talk about exploring Mars – we don’t want to do that.

Dr. Mark added that in 8/16 NASA roundtable, the first female Thunderbird pilot expressed her frustration about the amount of energy she wasted in an effort to her job with ill-fitting and inappropriate equipment.

Elizabeth Spencer (Deputy Director, National Institutes of Health Office of Research on Women’s Health (NIH ORWH)) explained that ORWH was established 25 years ago to look at improving the health of women across the country. Unfortunately, research shows that the health of women is declining. Life expectancy of women in Mississippi is now the same as that of a woman in Syria, and there is a need to understand the reason. In the federal work place, it wasn’t until men’s wives and daughters were impacted that there was attention paid to women's health. She said that she is physically diminutive and before ergonomic requirements, she felt like Edith Ann in her first job with chairs and desks unsuitable for her size. She explained that her office seeks fundamental knowledge, pursues studies and turns discovery into health, funding many programs including studies on gender and health. Her office wants

to see sex used as a biological variable for NIH policies. Gender/sex has significant impact on the cellular level for all age groups. She concluded by saying that it was important to study gender/sex-related factors to strengthen science.

Dr. Mark stated that there is long history of NIH partnerships with NASA which highlights the need for a common lexicon to share best practices and expand awareness.

Dr. Michael Manyak (Chief Medical Advisor of Crisis Response for Accenture, GlaxoSmithKline (GSK)) shared that GSK just hired the first female pharmaceutical CEO and that he feels their headquarters in London is very sensitive to equality and equity in that gender issues are being handled in an appropriate manner. He also gave examples in his particular field of urology, that the American Urologic Association had 4% women 20 years ago and now that is up to 24%. Currently, 50% of resident applicants are women. He acknowledged that women still handle more female-related health issues and male urological patients are still predominantly seen by male doctors. He commented that there is some self-selection although women do get kidney stones and bladder cancer.

Dr. Mark asked about the impact of gender/sex on technology and innovation such as surgical equipment and clinical trials.

Dr. Manyak responded that there are advantages to female surgeons with smaller hands which can fit in tighter spaces and that devices do not usually need to be tailored to the individual doctor. However, he said there was always room for improvement, and that GSK does include both men and women in gender neutral drug trials. He also works with the Explorers Club which 12 or 13 years ago elected its first female president and women are very active in the organization. Exploration is open to all genders, and gave an example where Smithsonian cavers using imaging equipment found a large collection of skeletons that no average sized explorer could reach so they advertised for women scientist explorers and recruited six petite athletic women. Dr. Manyak also co-wrote a travel and exploration book *Lizard Bites and Street Riots* and serves on the Board of Directors for the National Eagle Scout Association which encourages sending Eagle Scouts on remote expeditions. He said that he has invited the Girl Scout organization to form similar expeditions but there has been no response to date.

Dr. Mark encouraged Dr. Manyak to use the iGIANT to engage the Girl Scouts.

Dr. Eliza Lo Chin (Executive Director, American Medical Women's Association (AMWA)) described AMWA's mission to advance women in medicine and promote women's health. In the beginning, the organization focused on women's health centers, abortions, and reproductive health. Now they focus on education, promoting the sex and gender women's health collaborative and summits to bring together leaders of medical schools to discuss how to incorporate sex and gender into the curricula. She commented that the iGIANT brings AMWA to the technology forefront and not just medical care.

Dr. Mark added that health sector is often iGIANT's ambassador for the other sectors.

Chris Carberry (CEO, Explore Mars INC) thinks iGIANT is particularly important, if we are to land people on Mars by the 2030's and that this discussion is critical as preparations and systems are being developed. He anticipates that 50% of personnel going to Mars will be women, and that we may be committing people to 3 year journeys. Thus, it is important to begin thinking about gender-specific technological advances. He wants to infuse this topic into the next Human to Mars (H2M) Report and to give iGIANT a large role in the H2M summit in May 2017. He thinks this is a good time to start exploring collaboration in order to engage broader public participation especially around Science, Technology, Engineering and Math (STEM) organizations.

Dr. Coleman says a 50-50 gender projection for participation is very optimistic but it is very exciting to contemplate. Developing technologies for space makes them "sexy" and it helps accelerate the development of technology that should be done for terrestrial applications.

Mr. Carberry referred to a ten-part series hosted in the [Huffington Post](#), connecting how travel to Mars improves life on earth.

Dr. Mark asked how can we make issues of sex/gender relatable across the board and across all generations.

Dr. Florence Haseltine (Founder, Society for Women's Health Research (SWHR)) was introduced by Dr. Mark as the "Mother of gender/sex medicine". Dr. Haseltine said her career has been focused on gender/sex and science, and that as a surgeon she designed her own surgical equipment. Her activism to begin the Society for Women's Health Research became critical during the gender wars of the 1970's that proclaimed that everyone must be treated the same. It was medically evident that there were differences, but the political climate said they were the same. SWHR advocates went to Congress to get women included in clinical trials, and to create the Office of Research on Women's Health at the NIH. She said that we have to look at sex differences as a tool and that male and female cells perform differently. The impact of epigenetics can even be seen in-utero such as the different impact of maternal obesity on male and female offspring.

Dr. Mark discussed the NASA's recent decadal review that explored the impact of gender/sex on adaptation to space flight and she shared the Executive Summary which was published in the [Journal of Women's Health](#). She discussed visual impairment due to intracranial pressure (VIIP) which affects men and women differently during space exploration with male astronauts having more significant symptoms. The risk for radiation exposure is also impacted by sex in that women have lower levels of acceptable risk. She discussed the importance of precision medicine in space which is sometimes called 'astro-omics'. For example, NASA is examining the role of pharmacogenomics and long duration space missions. NASA wants to ensure that all male and female astronauts can live and work safely in space.

Dr. Mark announced a ten-minute break, asking participants to ponder the following statement before returning for the discussion portion of the roundtable:

- Imagine you are given a drug that causes toxic effects in your body.
- Imagine that you are given a shoe that is supposedly structured for your foot but instead damages it.
- Imagine that you are severely injured in a car accident because the car design or head rest isn't suited to protect your body.
- Imagine that you are using an electronic device, but it isn't adapted to your touch and you experience repetitive stress injuries.

Discussion:

Dr. Mark said that over next hour we should be able to talk about working together, not just working and thinking within our individual silos.

Mr. Carberry said we've always worked well with diverse stakeholders. " Only program in which we've encountered challenges specifically in this area was at the Women in Mars conference. Ran into a surprising amount of gender politics. When you experience so much backlash, you really have to be very sensitive on each issue." One issue involved the conference poster which was of a female astronaut which used NASA Deputy Administrator, Dr. Dava Newman, modeling her design for a biosuit. Women in Mars leadership had selected it yet a woman's group was complaining that the poster was sexist and inappropriate. Other issues like that came up, so he has refrained from hosting a similar conference again. However, He does think there needs to be more women in the space community involved in Mars research.

Dr. Mark gave an example of backlash when marketing to women becomes pandering. For example, car manufacturer , SEAT MI, and Cosmopolitan magazine recently promoted a car for women highlighting black paint styled like eyeliner around the headlights generating significant social media backlash. She commented that If they had focused on the safety issue than this new design might have been received more positively. "This is an opportunity to use the iGIANT model to share best practices for gender/sex-specific design elements."

Ms. Buettner stressed that is important to note that we are can talk about the difficulty of balancing perceived political correctness with the need to address certain gender differences and technical requirements.

Mr. Sifakis said it is best to have both men and women address gender/sex issues, and that at IDEAGEN, they talk about creating trust through using a common language-trust and communication are key. " What is brilliant about iGIANT is that Dr. Mark has democratized the concept – you can all use it. It's a testament to someone who is really the spark and wants to make change because once stakeholders get involved, they own the issue." He commented that the greatest challenge is to include the key constituencies who will be part of the solution. For example, we should include the filmmakers. IDEAGEN has a Films for Good fund to help fund filmmakers to tell the stories that need to be told. "The power of storytelling is something that we miss in Washington, DC. When you skillfully tell a story, it cuts through political correctness". He sees a lot of exciting interaction between iGIANT and Ideagen.

Dr. Mark added that one iGIANT goal is to develop an iGIANT seal of approval based on sound scientific evidence. Eventually, she also hopes to develop scholarships and innovation prizes to inspire more inclusion of iGIANT concepts in product design, protocols, programs and policies.

Ms. Wu continued the discussion on the power of narrative and talked about bringing together filmmakers and scientist to increase outreach and improve the scientific element in the films. She noted that a significant challenge is that sex and gender differentiation is often viewed as reactionary rather than being perceived as value added to your design. Her experiences echoed Chris Carberry's comments. She said that iGIANT needs to get ahead of the discussion. Historically, studies she has been involved in haven't focused on gender because of size (small) of samples. Anecdotally, lessons learned from the NASA Mars virtual simulation studies for speech aphasia have been used to design therapy for stroke victims. She feels it would be important to consider issues of gender and sex in most studies. Some of her colleagues examine warning systems in cockpits and the different responses to a male or female voice. "We need to procure more evidence and then it would reduce liability and have commercial implications. Once those studies are available, there has to be a mechanism for taking that to industry."

Dr. Mark said that a recommendation from the August 2016 roundtable at NASA was the creation of a video repository of stories from retired astronauts, flight surgeons and engineers. She commented that much effort was put into the creation of Offices on Women's Health in government which oversee the inclusion policies for gender/sex in research. "It's time to take it to the next level, namely, to translate these findings into design elements. What legal issues need to be considered? Do we need to move the translation of research into a legal or legislative framework? From a legal perspective, is it gender discrimination or a violation of the Civil Rights Act if women or men do not have the tools and resources to do their jobs safely and effectively?"

Ms. Biegel suggested that you make inroads to a government agency through implementation of existing law or regulation. She used an example in the health sector. For example, when trying to change policies related to coverage, efforts were targeted to existing Medicare and Medicaid policies and legislation Insurers then followed.

Ms. Spencer felt that the scientific advancements and innovation and revelations of the influence of sex at the cellular level should come first which may accelerate the translation into design elements than a policy and will provide a stronger mandate. Communication and training are key since new scientists are entering the workforce all the time and are drivers of change.

Ms. Buettner said commercial or consumer motivation should lead and then trickle up to legislative action.

Mr. Sifakis discussed grant making by private foundations as a means of influencing products and policy. He also used an example of his wife's Italian restaurant where the design of a top

notch meat slicing machine makes it very difficult for someone of smaller stature to operate." Should the machine be redesigned?" Consumers will drive progress.

Dr. Manyak suggested that a jackhammer won't be redesigned to accommodate individuals. He said much of today's equipment is already more gender specific. He believes that there have been many changes and more are needed. However, he stated that the of design of surgical instruments for urology is already specific enough for the task." Maybe a particular tool needs to be adjusted for smaller hands, but this is more the exception than the rule".

Dr. Mark cited an example that was discussed during the iGIANT Transportation roundtable in Detroit. It was mentioned that after NAFTA passed, there were male truck drivers who enlisted female partners to become drivers. The cabins had to be redesigned which benefited all truck drivers.

Commitments:

Mr. Sifakis gave Ideagen's commitment to infuse iGIANT concepts including the concept of gender/sex design into Ideagen summits. He plans to survey companies at the next summit to see what they are doing in this area and submit the results to iGIANT.

Ms. Wu said that the roundtable increased her awareness of gender sex issues and how it applies to her current projects including sleep hygiene and public outreach. " Gender is not an independent variable. So moving forward, I will push to include more gender consideration in work."

Dr. Mark suggested Ms. Wu work with Dr. Haseltine and the SWHR since they have a sleep work group.

Ms. Biegel will continue to help iGIANT grow and make people aware of its work as a founding board member.

Ms. Buettner said she will look into how iGIANT can use existing legislation like Title IX as a vehicle for change.

Ms. Spencer was inspired to see enthusiasm at this roundtable, and will take the message back to staff at ORWH that the vision that they are trying to implement is being carried on enthusiastically by iGIANT. They want to expand their abilities to communicate and educate the public and participate in future iGIANT activities.

Dr. Mark said iGIANT wants to help translate the research that NIH has supported into gender/sex-specific design elements.

Dr. Manyak said his action item is to continue to try and contact the Girl Scouts to get them interested in copying the model of Eagle Scout exploration to help cultivate a generation of female explorers and scientists. Dr. Mark offered iGIANT's assistance with this effort..

Dr. Chin said she will continue to help promote iGIANT roundtables around country and will inspire curriculum leaders and student leaders to engage the millennial generations. She feels it critical to train young people to think differently and the iGIANT is a tool to achieve this transformation.

Mr. Carberry will integrate iGIANT into the 2017 Humans to Mars Summit and Report through a potential public/private iGIANT roundtable during the week of the conference.

Conclusion:

Dr. Mark told the group that Keri Kukral, one of the roundtable's champion co-hosts and iGIANT ambassadors, planned to attend but was detained due to transportation issues. She has secured the Zanuck theater on the Fox movie studio lot for an iGIANT roundtable on December 10th in Los Angeles. This event is affiliated with her Raw Science TV film festival. Ms. Kukral is actively bringing the film industry to iGIANT which will promote more cross pollination of ideas between sectors.

Dr. Mark said health care leaders were iGIANT's original ambassadors, but the growing cross sector discussions have been very inspiring. She said, "As we build the iGIANT, we plan to offer innovation prizes, scholarships and the iGIANT seal of approval for design elements".

Dr. Mark thanked all participants for becoming iGIANT ambassadors.