

## The Future of Human Spaceflight: Prospects, Programs and Educating the Pipeline

[Women in Aerospace](#) (WIA) and its chapters in Canada and Europe, WIA Canada and [WIA Europe](#), teamed up to organize an international discussion on the future of human spaceflight (HSF) at the Stevens Institute of Technology in Washington, DC on Thursday. The event was also supported by the International Space University (ISU).

Intentionally scheduled to follow the International Academy of Astronautics' (IAA's) 50<sup>th</sup> anniversary [celebration](#) held at the same building the previous day, the WIA discussion touched upon the theme of international cooperation, the focus of the IAA meeting. Referring to the IAA event, Andrea Boese, Deputy Head of the Integrated Space Policy Department at Germany's DLR, said it revealed that agencies share the conviction that "you cannot do it alone" in space. She said IAA's task now is to take the declaration endorsed by the participants – which she characterized as purposely "very soft" so that everyone could agree – and raise its public and political awareness.

The WIA meeting focused on the new actors involved in HSF, the need for increased diversity in the aerospace workforce, and the challenges of raising public awareness about space activities and of bolstering STEM education.

### A Changing Landscape for HSF

As a self-described "product of the Star Trek generation," Lynn Cline, Deputy Associate Administrator for Space Operations at the National Aeronautics and Space Administration, explained that, for her, space exploration "was a given...an inevitability." She went on to explain that the context of HSF has shifted over the years. Not only is it no longer the activity of a few selected governments, with a growing private sector role, but there are also more countries getting involved. Even countries that do not have space programs have expressed interest, she noted.

The prospect for the future is bright, she said, "but we should walk before we run." Cline pointed out that one important challenge would be ensuring the full utilization of the International Space Station (ISS). She said that governments have a big role to play in "paving the way in this research," and mentioned specifically the research done at the cellular level in microgravity conditions.

While not describing specifically what kind of activity should be commercialized, Cline said that, as capabilities mature, we should also be transitioning to commercial activities and that the time would come when that process would happen in HSF. "Prospects are bright and varied; there's roles for everybody," she concluded.

Responding to a question about how commercial activities are impacting HSF, Cline said that after the Space Shuttle is retired "our human spaceflight program [is] very much counting on [the commercial companies] to come through" for cargo, "and

ultimately” crew transportation to the ISS, in addition to U.S. international partners. Tanja Masson-Zwaan, President of the International Institute of Space Law, also commented on this question. She held that a mix of government and commercial is “the new buzz word” and the way to move forward. This, she suggested, also inspires people and may stimulate further international cooperation among countries. “It’s a whole new ballgame,” she said.

## Education and Diversity

Panelists also spoke about education and diversity in two contexts, which Debra Facktor Lepore, past WIA Chair and Executive Liaison for the SIT School of Systems and Enterprise, who moderated the panel, described as the dual goals of educating the public and transferring the skills needed to the aerospace workforce. On the first point, Masson-Zwaan agreed that “public perception of space” was a real problem and that there was a need of better communication. Referring to NASA student projects that thrive on involving people with different educational backgrounds, Cline added that “we need people who can communicate well” and are adept at “getting out of the acronym speech.” She said it is important to translate both the dream and the technical aspect to the public.

Speaking of diversity in the context of higher education, Steve Brody, Vice President of North American Operations at the International Space University (ISU), began by saying that “space is one of those fields that makes us feel [like] a single species.” But “to educate the pipeline there has to be a pipeline” he said, and suggested that the critical age in education was the middle school years (6<sup>th</sup> – 8<sup>th</sup> grade in the United States) when students begin to receive subliminal messages about their abilities. Brody said that role models were key in translating the vision of HSF - one that is irrespective of discipline or gender. A participant mentioned that ISU and WIA have a joint initiative to foster more inclusive membership in the aerospace field by awarding a cash prize to student chapters with higher percentages of women and students of multidisciplinary backgrounds.

An audience member talked about reduced levels of students in STEM fields affecting the workforce in the United States. Boese said this problem is also being manifested in Germany where – at least for DLR – it is not a problem of insufficient jobs, but finding qualified people to fill them. Boese said they were “running into a problem” but did not know exactly what it was that was driving many young students in the country away from the aerospace sector.