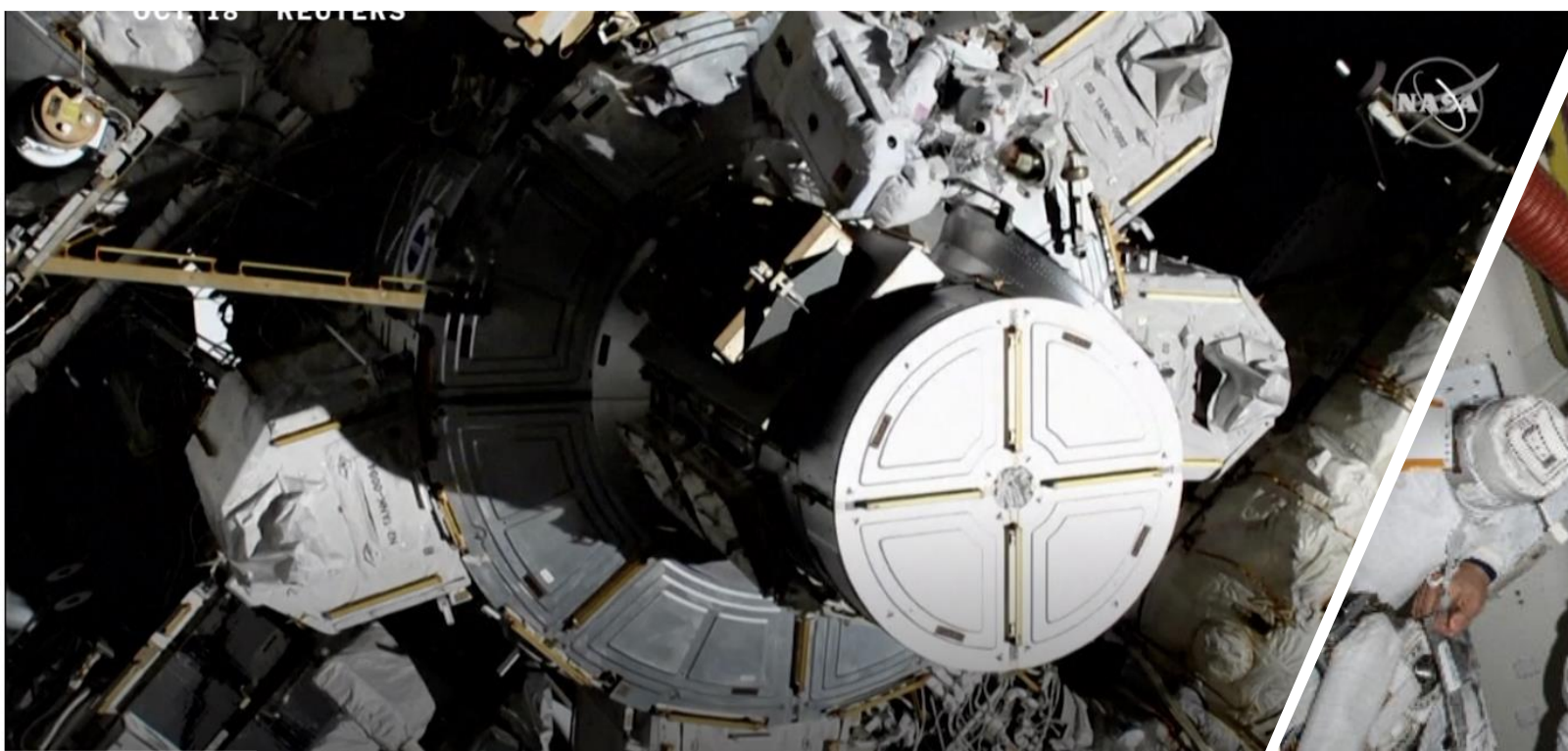


# Gendered Innovations

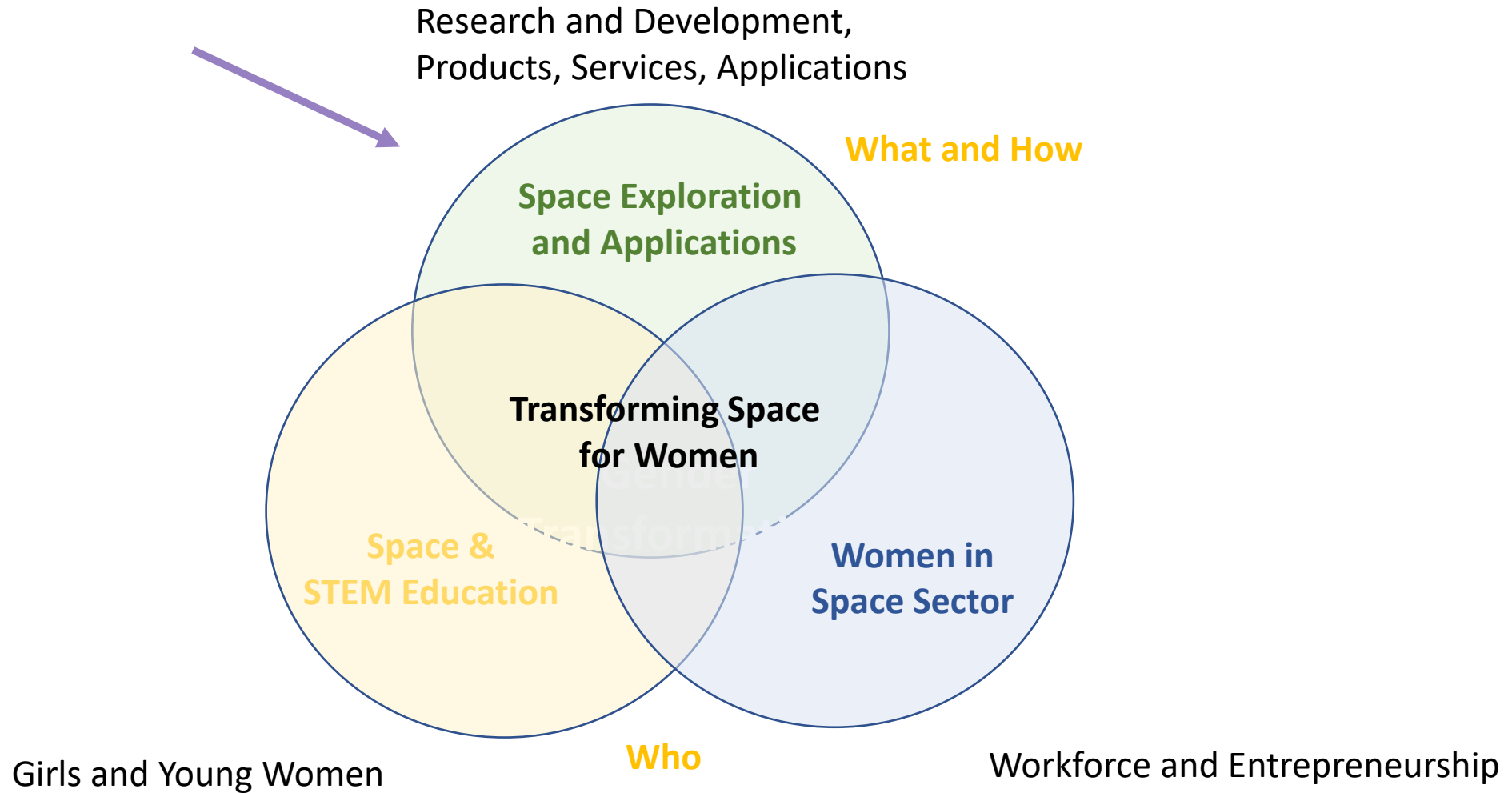
Taking a Gender Lens in Space Research, Development and Applications

Jennifer Breslin





# Transforming Space for Women

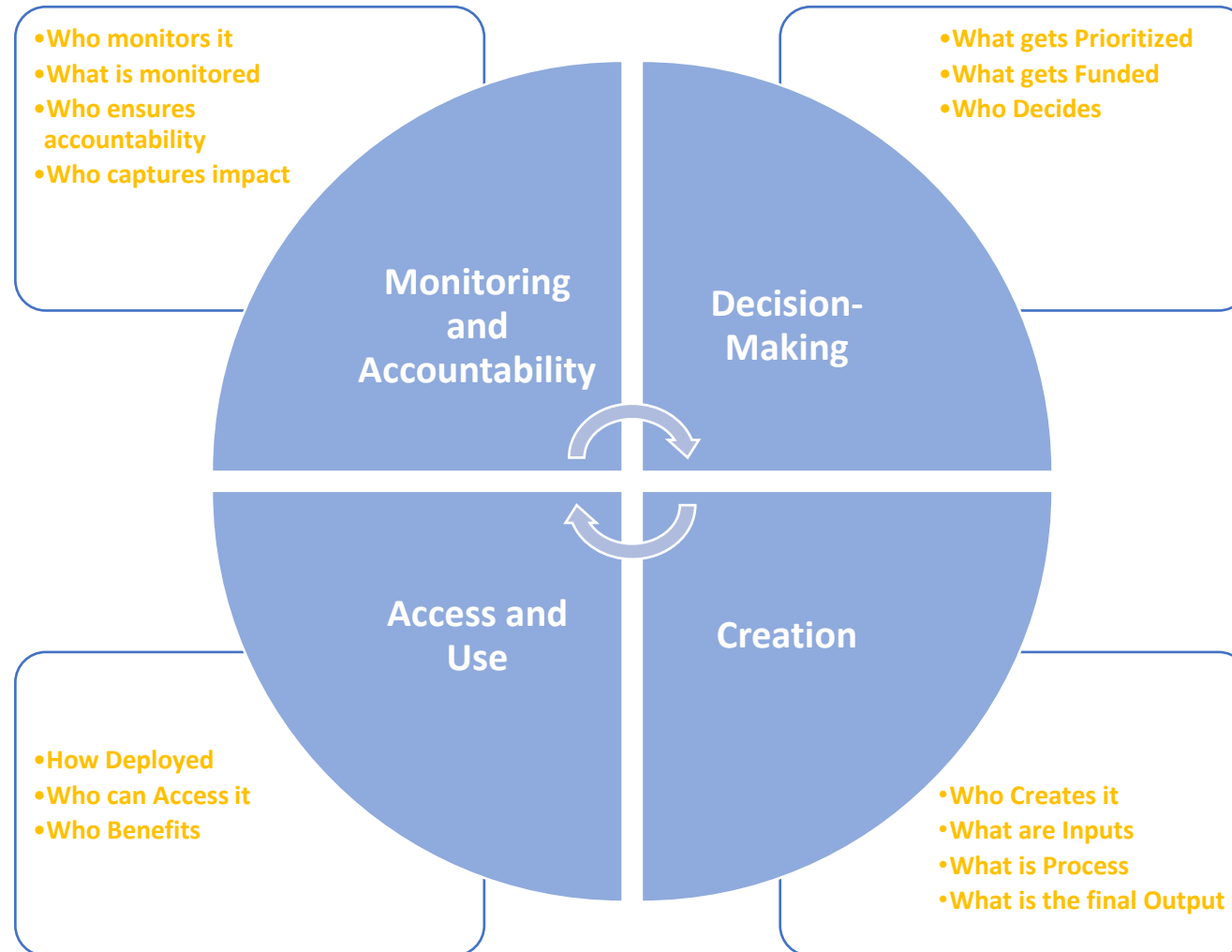




# The Social Life of Science & Technology

## Lifecycle of R&D, Product, Service, Application

The social dimensions of science, technology and innovation



# The Social Life of S&T

## GENDERED INNOVATIONS

Women involved in monitoring and evaluation

Accountability mechanisms in place for negative impacts

Steps taken to ensure women's access and use/ benefit

Consider different contexts and potential impacts

- Who monitors it
- Who ensures accountability



- Deployment
- Who can access it
- Who is impacted

Monitoring and Accountability

Decision-Making

Creation

Access and Use

- What gets Prioritized
- What gets Funded
- Who Decides

- Who Creates it
- Inputs
- Process
- Output

Women in positions of influence and power

Women's needs and priorities accounted for and backed with \$

Women in development teams

Women users/impacted engaged

Women's differentiated perspectives, needs and realities accounted for

# Benefits of Gendered Innovations for All



**Increased excellence** including through better innovation and greater relevance and effectiveness



**Higher financial returns**, including through new markets

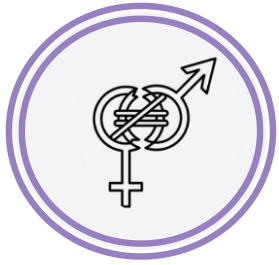


**Reduction in harm**, increased safety and related improvement in reputation and risk management



**Improvement in the lives of girls/women and societal outcomes**

# Potential Benefits of GI for Women & Girls



## RECOGNIZE, PREVENT & MITIGATE!

### Negative Stereotypes and Practices

Actions that cause harm along gender lines, that create new or reinforce negative practices, or that simply ignore gender all together (“neutral”).

#### EXAMPLES

- (-) Facebook algorithm that included biased labels so that certain typically “male” jobs – like construction - did not ever appear to women.
- (-) Transport and the “ideal” male
- (-) Tracking women through iTags
- (-) Voice assistants that re-enforce gender bias
- (-) Clinical research not required to take women into account until 1990s = women are greater adverse risk from medication



# Potential Benefits of GI for Women & Girls



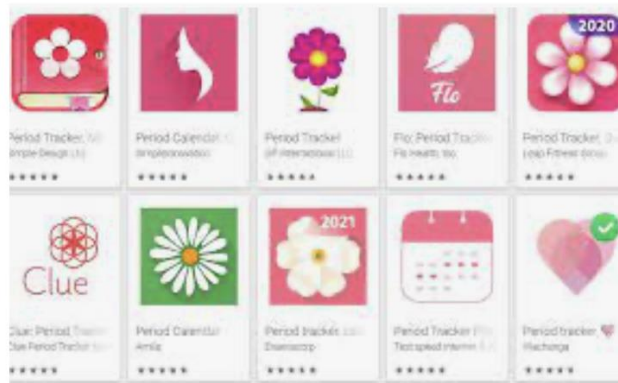
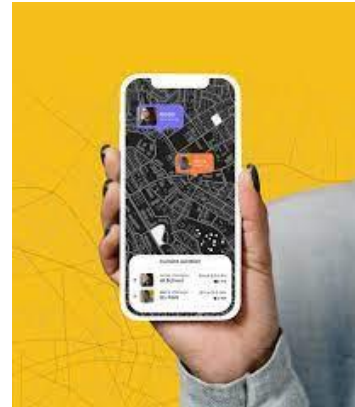
## IDENTIFY & EXPAND

### Meeting Specific Needs of Women

Actions that recognize and address the specific and differentiated needs and realities of girls and women. Gender-sensitive.

#### EXAMPLES

- (+/-) FemTech like safety, period tracking and pregnancy related apps and interventions (privacy issues)
- (+) Women's pain and mental health treatment



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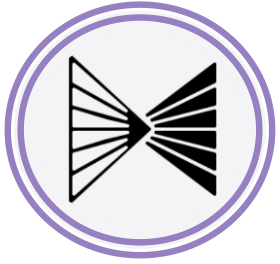
BIOTECHNOLOGY

## Psychedelics are having a moment and women could be the ones to benefit

Psychedelics are being scientifically researched now more than ever. This time, women might finally benefit.



# Potential Benefits of GI for Women & Girls



## UNDERSTAND & ACCELERATE

### Transformative Empowerment

Actions that address and change underlying systemic barriers and unequal power dynamics. Emancipatory.

#### EXAMPLES

- (+) Changing S&T funding systems to better support women
- (+) Highest level strategies, policies and accountability mechanisms

## Algorithmic Justice League



#### PREVENT HARMS

How might companies and organizations build algorithmic systems that are more equitable and accountable? The CRASH Project will explore the feasibility of mechanisms such as bug bounties, coordinated bias disclosure, intersectional AI audits, education, and more in order to help build better systems and reduce harms.

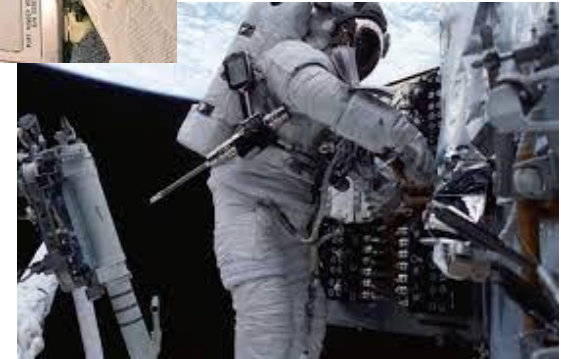


# Gendered Innovations in the Space Sector

## Human Spaceflight

- Ladder rungs are set at the optimum distance for the average man. The pistol-grip tool, or cordless drill, is sized for a man's hand.
- We know that astronauts receive more radiation in space. Studies on Earth show that [radiation can affect women](#) at a rate 10 times higher than men. How will that play out in space?
- Toilet
- VR – used for astronaut training – can cause nausea in women due to goggle fit.

“Women are asked to compromise about seemingly small things in order to participate. Every time we do that, we carry those imprints forward into the future.” Mary Robinette Kowal



# Human Spaceflight



## FEMALE ASTRONAUT



Women suffer less from hearing loss with advancing age, and do not display a bias towards loss of hearing in the left ear



Women demonstrate a slight bias towards accuracy versus speed in response to an alertness test



Women mount more potent immune responses



Struvite kidney stones more common in women



Female astronauts, (to date) do not exhibit clinically significant visual impairment



Female astronauts are more susceptible to orthostatic intolerance



Urinary tract infections are more common in female astronauts



Large individual variability to muscle and bone loss in women



Health effect observed on Earth

+ Space Gynecology

## MALE ASTRONAUT



Men suffer more from hearing loss with advancing age, and display a bias towards loss of hearing in the left ear



Men demonstrate a slight bias towards speed versus accuracy in response to an alertness test



Men mount less potent immune responses



Calcium oxalate kidney stones more common in men



Some male astronauts exhibit clinically significant visual impairment



Male astronauts less susceptible to orthostatic intolerance



Urinary tract infections less common in male astronauts



Large individual variability to muscle and bone loss in men



Health effect observed in space

FUTURISTAS



## The Sex & Gender work groups released five recommendations:

1. Select more female astronauts for spaceflight missions.
2. Encourage and facilitate the participation of more female and male subjects in both ground and flight research studies.
3. Focus on the responses of individual astronauts to spaceflight and return to Earth.
4. Include sex and gender factors in the design of the experiments.
5. Incorporate sex and gender and other individual risk factors into NASA-funded research programs.

**The Women's International Space Simulation for Exploration (WISE)** study involved the collaboration of 12 scientific teams from 11 countries. The purpose of the study was to assess the physiological and psychological effects of long-duration space missions on women and to see how these effects can be reduced through exercise and nutrition (RC, 2005).



# Gendered Innovations in the Space Sector

## Applications

- Ignore/Neutral
- Designed With and for Women
- Transformative



### Mapping Land Rights for Women in Tanzania

In Tanzania, USAID piloted the app MAST (Mobile Application to Secure Tenure) to support more sustainable and equitable land governance. In much of the world, land ownership can be a major source of income, so better mapping and fair distribution can be a tool for advancing gender equity. Geospatial.



# Examples of GI from S4W Community

## Application at Grassroots

- Geospatial Rally for Women (Morazan Project)
- Costa Rica, Honduras, Guatemala, JAXA
- Rural women involved in design and creation of cube-sat program; trained in use of technology; applications determined according to women's needs in area of climate resilience.
- Contact: Maria Jose Molina Montero

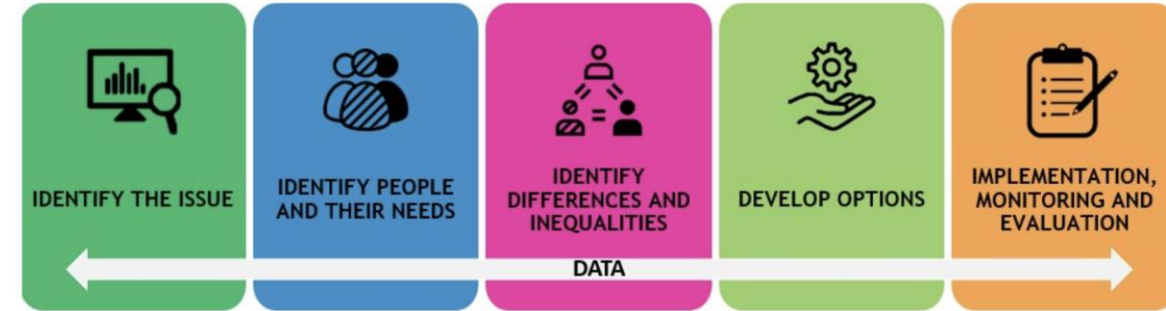


# Examples of GI from S4W Community

## Canadian Governmental Policy

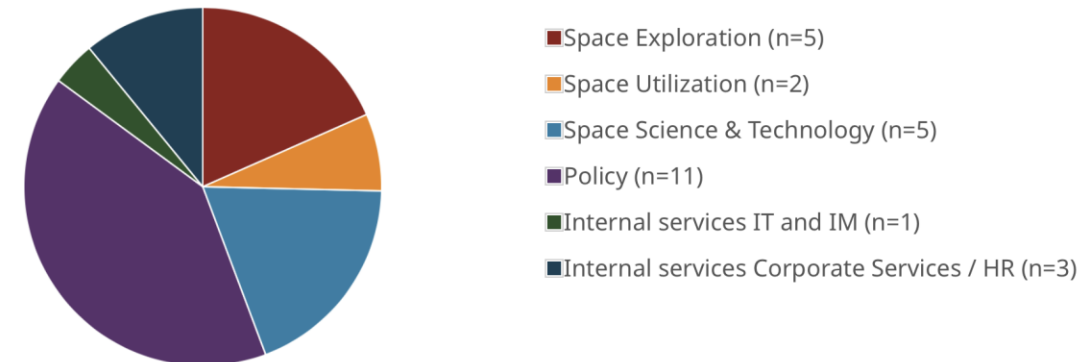
- Gender Based Analysis + in the Canadian government, including the space sector
- GBA Plus is an analytical process that provides a **rigorous method for the assessment of systemic inequalities**, as well as a means to assess how diverse groups of women, men, and gender diverse people may **experience policies, programs and initiatives**. It is an analytical process designed to help us ask questions, challenge assumptions and identify potential impacts, taking into account the diversity of Canadians.
- In 2017, the CSA developed an official Policy on GBA+ committing the CSA to integrate GBA Plus into its decision-making processes, and **requires for all CSA initiatives** (e.g. policies, programs, projects, grants and contributions, budget proposals) that are **new** or which **need re-approval** to be subject to GBA Plus to ensure they do not have detrimental impacts on certain diverse groups of women and men and non-binary people.
- Contact: Lauren Gravis

FIGURE 1. STEPS TO DOING A GBA Plus



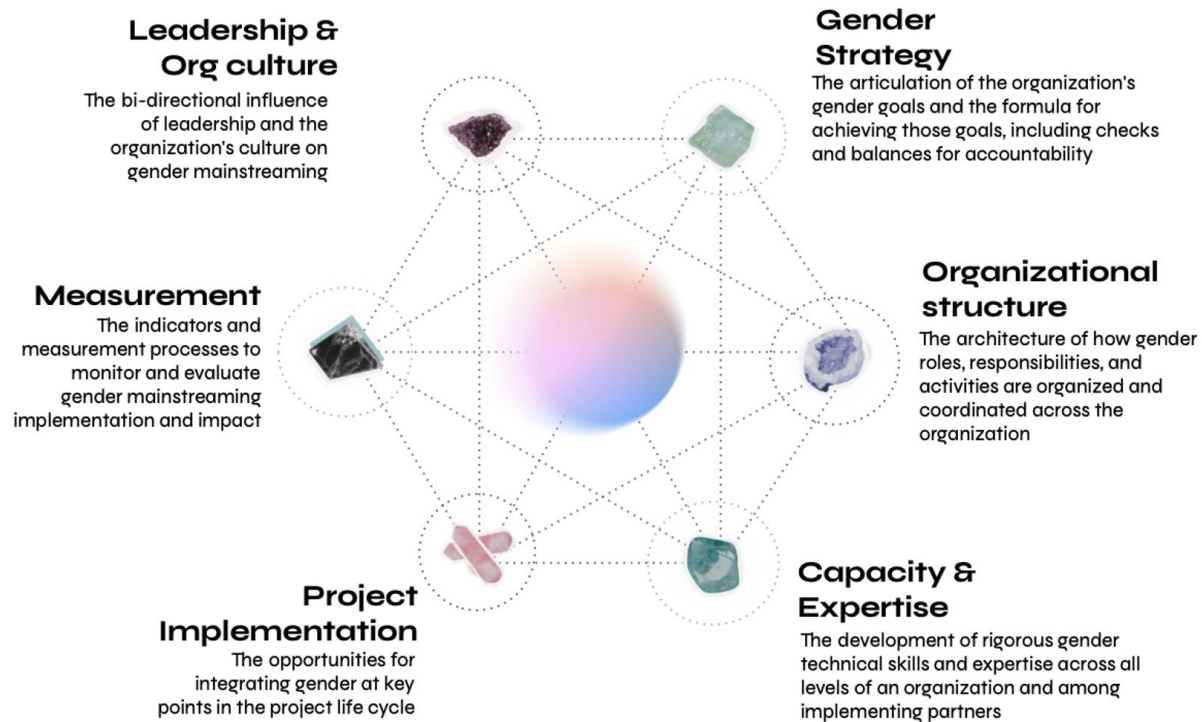
GRAPH 1. COMPLETED GBA Plus BY CSA BRANCH

GBA Plus

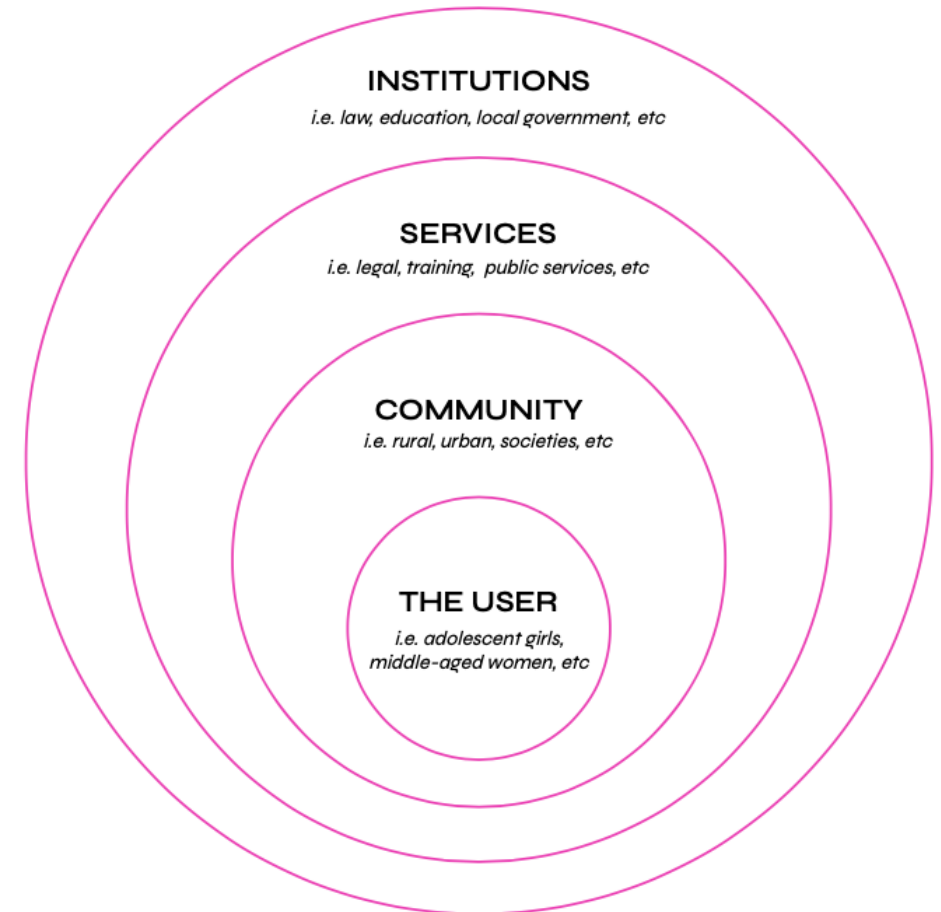


# What Can We Do?

## INTERNALLY WITHIN ORGANIZATIONS



## EXTERNAL



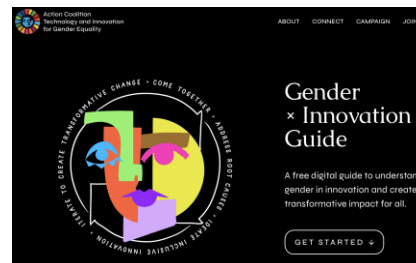
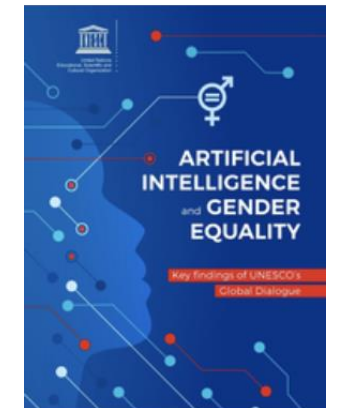
From the

Action Coalition on Technology and  
Innovation for Gender Equality



# What Can We Do?

- Learn more!
- Raise awareness, advocate, assess, and implement within your organization and field
- Allocate funding for GI
- Build partnerships with women's organizations and gender experts
- Connect to those of us working on this, contribute to our knowledge base of lessons and impact stories and work with us on contextualization for the space sector.







**2021 NASA HMP Collins Aerospace Spacesuit Technologies Tests in Oregon**  
Collins Engineer Ashley Himmelmann at Big Obsidian Lava Flow, Oregon (NASA HMP)



**Connect!**



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