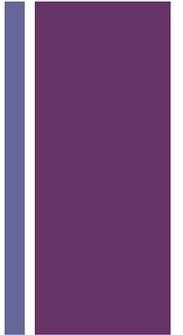


# Challenges for Women Inventors and Innovators in Using the IP System – A Review of Literature

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# + Presentation Overview



- Women Inventors: data and trends over time
- Key influencers and barriers to women becoming inventors and innovators
- Conclusions and recommendations



Lack of systematic and consistent sex-disaggregated data collection has made it difficult to obtain a full picture of women's patenting activity, and to track it over time.

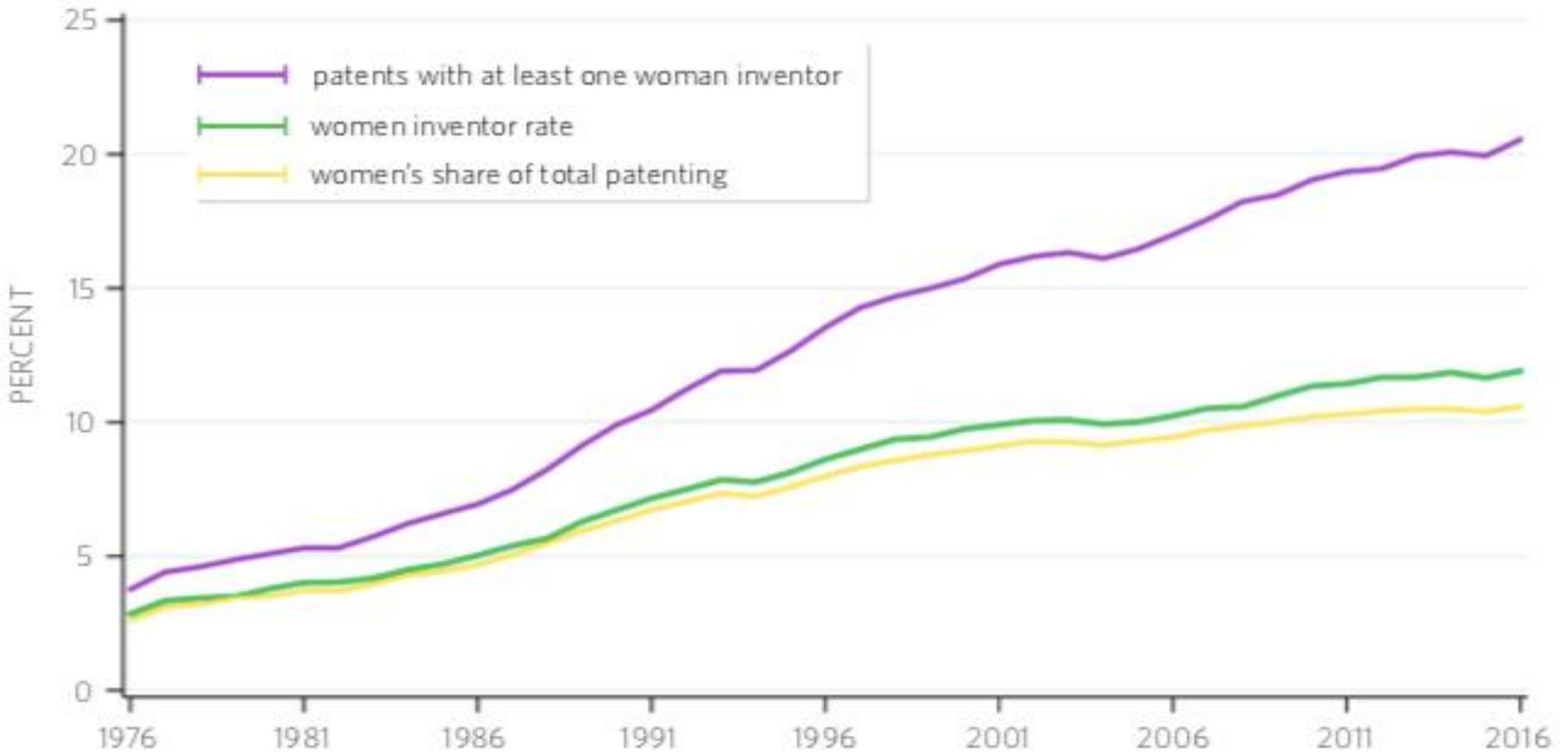


### Key issues

- Inventor name must be named, but not the gender of each applicant on patent applications
- This requires inferring applicant gender by name - an imperfect process
- Different sources use different measures and definitions to assess women's patenting activity

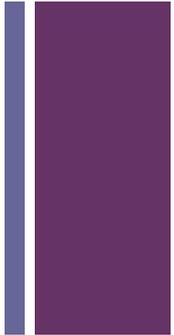


40-year trends among women in patenting in the US, 1976-2016: women inventor rate and women's share of total patenting remains low, but patents w/at least one woman on team are on the rise

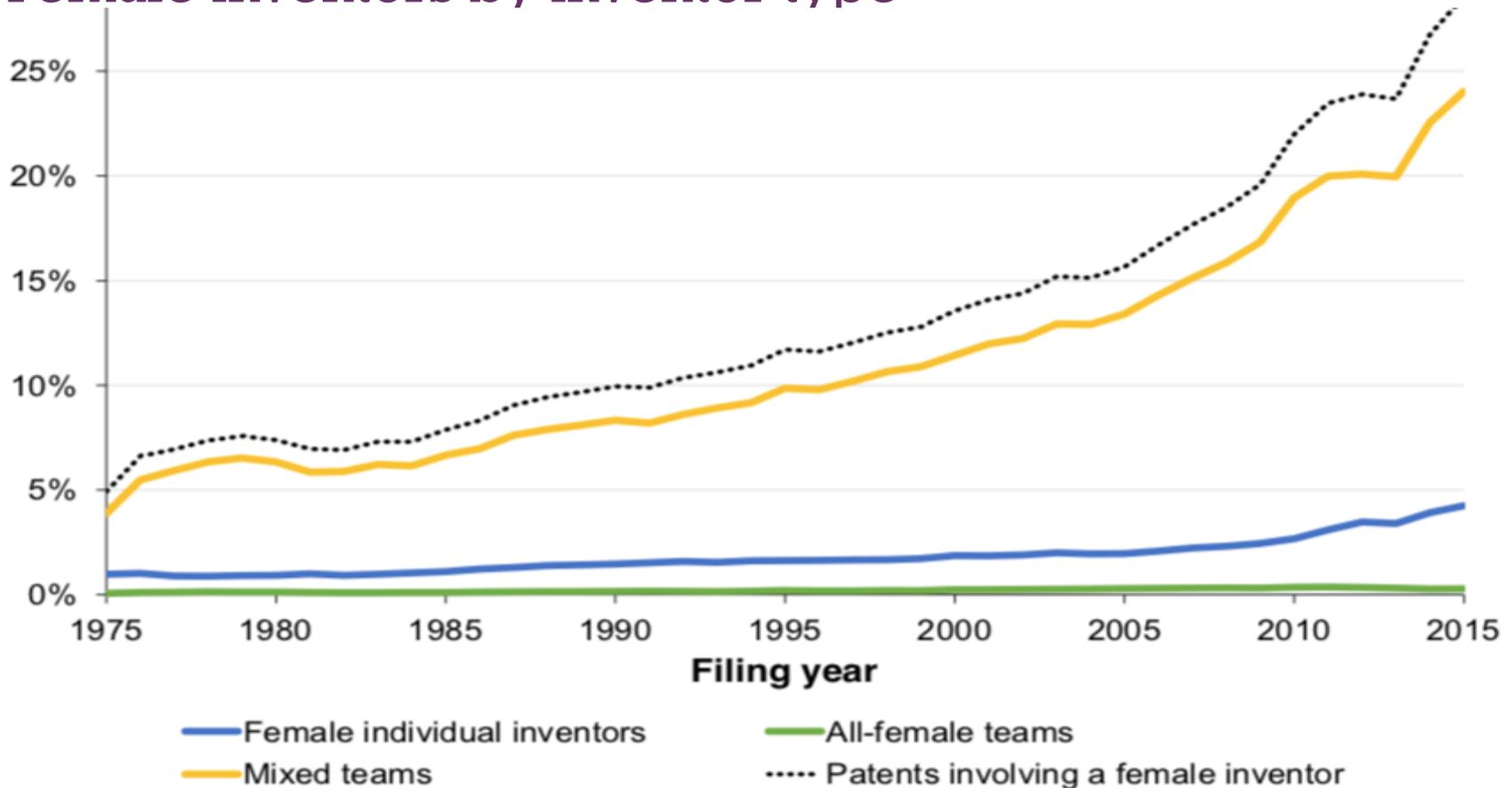




Female inventors are very unlikely to work on their own or on all-female teams, and most likely to be part of mixed teams.

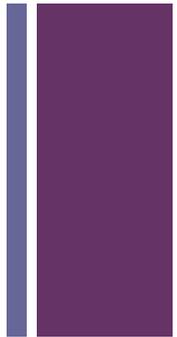


## Female inventors by inventor type





## Women inventors cluster in particular technology categories and environments.



<b>Fields with highest share of PCT applications w/women inventors</b>	<b>Fields with lowest shares of PCT applications w/women inventors</b>
Biotechnology	Civil engineering
Pharmaceuticals	Engines
Organic fine chemistry	Pumps and turbines
Food chemistry	Machine tools
Analysis of biological materials	Transport

- Type of employer also matters:
  - Women are more likely to patent in academia than government or business.
  - WIPO: 51% of PCT applications in academia involved women vs. 30% in business
  - In some developing countries, female patents tended to cluster in low tech products and processes



What are the key influencing factors and barriers to women becoming inventors and innovators?

# + Lower labor force participation rates reduce the available female talent pool.

- Globally, the female LFPR in 2019 was 47%, compared to 74% for men
- When women do work, they are less likely to be in types of jobs that lend themselves to innovation & more likely to be in vulnerable employment
- Women are also less likely to be entrepreneurs, and more likely to be in necessity-driven, subsistence level entrepreneurship



# + Lack of childhood exposure to female inventors is a key influencing factor.

- Researchers (Bell et al.) have found that children's chances of becoming inventors vary widely with characteristics at birth (e.g. race, gender, socio-economic class)
- Exposure to female inventors significantly influences the probability that a woman invents, but exposure to male inventors had no impacts
- Accord. to Bell et al, if girls were exposed to female inventors as boys are to male inventors, the gender gap in innovation would halve.

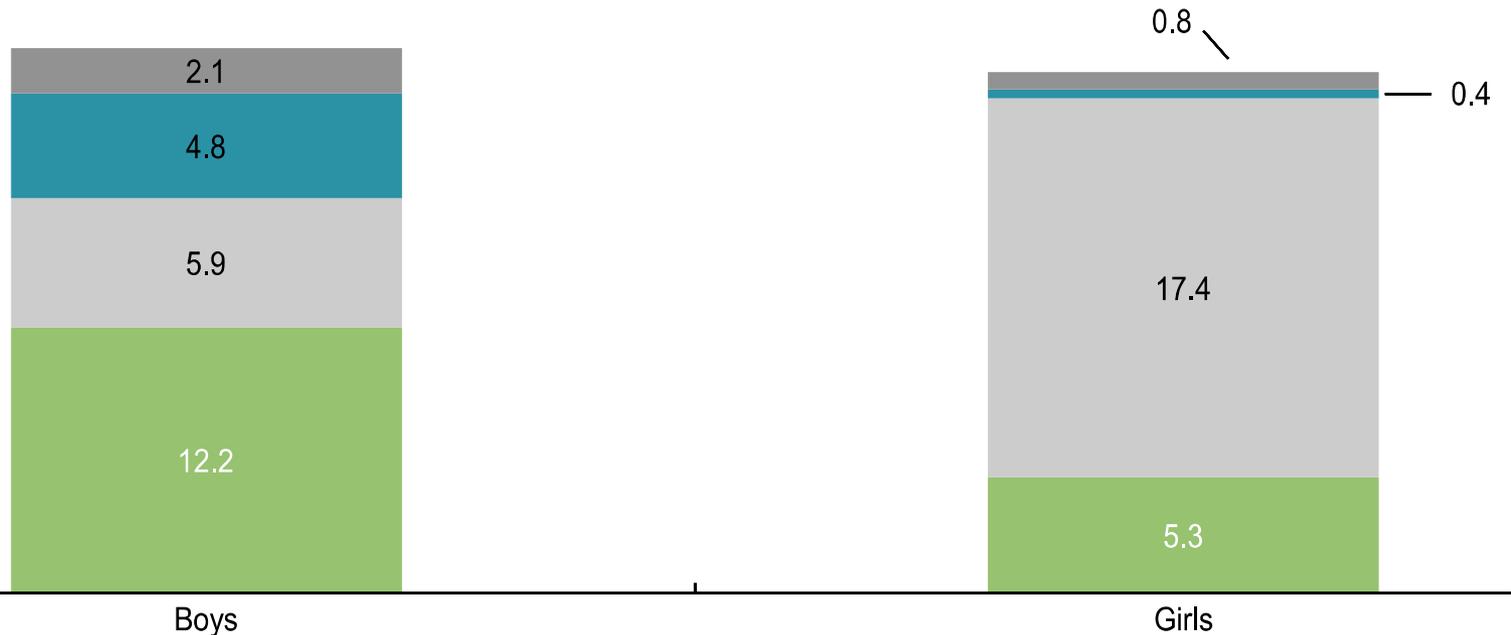


# + *Under-representation of women in STEM fields is cited as a key reason for the gender disparity in innovation and patenting*



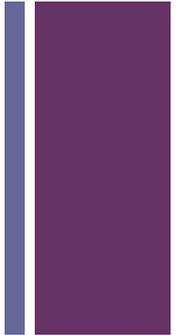
**Proportion of 15-year-olds who expect to work in a science-related occupation by age 30, by type of science professional, OECD average, 2015**

- As science and engineering professionals
- As information and communication technology (ICT) professionals
- As health professionals
- As science-related technicians or associate professionals



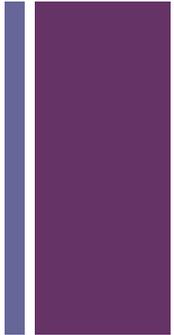
## + Even when women are in STEM, they patent at lower rates.

- Women progress more slowly into roles where patenting is more likely
- Women are also under-represented in patent intensive fields and patent-intensive job tasks.
  - E.g. women are under-represented in patent intensive fields of study, like electrical and mechanical engineering, compared to life sciences
  - They are under-represented in patent-intensive job tasks, such as development and design

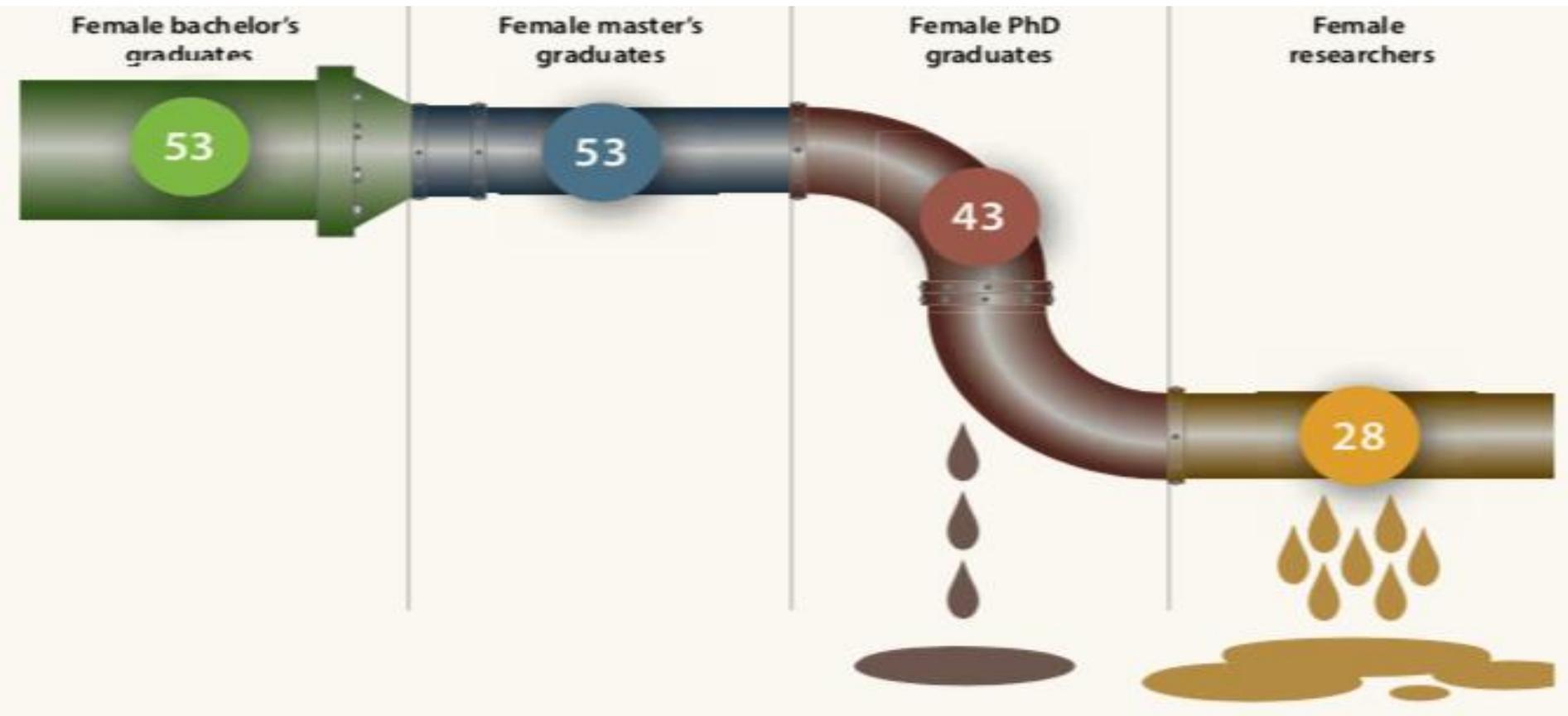




Female participation in research declines with each step up the ladder. They are often more likely to work part time, as contractors, and earn less.

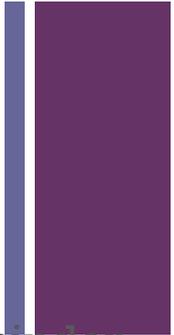


The leaky pipeline: % of women in higher education and research





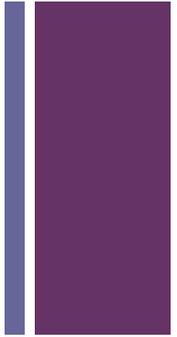
## Discrimination, bias, sexism, socio-cultural norms and expectations hinder women's success.



- Unsupportive work environments, sexism, discrimination, and macho culture hinder women's advancement in STEM careers
- Being a solo female on a team can be isolating
- Women have high drop out rates in relevant careers - female attrition rates in STEM spike ca 10 years into career – a critical time for advancement but often also for family pressures
- Family and household burdens: Gender expectations resulting from women's reproductive and domestic roles can significantly impact women's career progression
- Bias: conscious or unconscious bias can seep in into both hiring, promotion, or funding decisions & patent application process
  - In US, in 2016 females had 67% acceptance rate vs 73% acceptance rate for male patent applicants; female patent applications are less likely to be appealed; when granted, have more words added that reduce scope and weaken protection
- Lack of strong professional social networks: research suggests industry contacts are strong predictor of patenting involvement and women have fewer than men



## Access to resources, and other gender issues with the IP process



- Lack of access to public and private funding
- Lack of understanding of the importance of IP registration, and resources to undertake it
- Financial and administrative barriers in the patenting process
  - Can be especially a burden for women in developing countries who are too cash and time poor to engage in a costly, burdensome process
- Potential gender bias in the IP law –
  - Gender bias playing a role in determining what is worthy of legal protection
  - Difficulty reconciling IP rights with traditional beliefs about communal property and women's traditional knowledge, and traditional cultural expressions

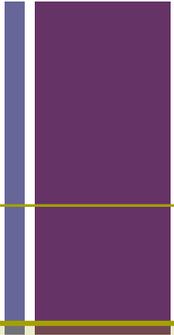


# Conclusions



- A multitude of challenges hold women back
- Addressing this requires multifaceted approaches, there is no one single approach that will make a major difference alone
- WIPO and Member States should make a concerted effort over time, with dedicated resources
- Some efforts can be driven by individual Member States or WIPO, others could be impactful as collaborative efforts

# + Recommendations



Improve the collection and use of sex-disaggregated data

Encourage female entry into patent-intensive STEM fields and careers

Increase women's access to critical resources, especially funding

Address socio-cultural issues and bias that inhibit women's innovative potential

Support networking, collaboration, and learning

Reduce the complexity and cost of the patenting process & strengthen national capacity to serve women inventors and innovators

Improve enforcement of rights in developing countries, incl. in female-dominated areas

Support proactive policies and more research (e.g. on seemingly gender neutral IP policies and laws)