# Stopping the Leak: Consulting Gig Scientists to Plug the "Leaky Pipeline" and Increase Community Access to Experts

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***Idea in a nutshell***

Clearinghouse for "leaky" scientists to leverage expertise for communities, businesses, research groups who need consulting expertise

This venue would provide a central hub for scientific "gig" contractors to reconnect leaky STEM worker pipeline with the workforce and allow communities and academics access to on-demand expertise.

***What is your specific, differentiated recommendation?***

This 'broadening participation' idea develops a virtual network of short-term science consultants through the NSF CoPe HUBs. Individual scientists can post their expertise, and local communities, businesses, and academic labs can reach out for known research needs, with the hub serving as a matchmaking service.

This project tackles two key goals in broadening participation: 1) provide a way for leaky STEM professionals (those that have left the scientific workforce for periods of time - gaps in resume, maternity, changes in overall discipline, etc.) to contribute to the scientific community and provide their scientific expertise, and 2) connect communities with experts that may not be affiliated directly with universities or agencies, but can serve local needs.

***What impact or value does it seek to deliver?***

*First key benefit:* Retaining groups that have traditionally been lost and are historically underrepresented in STEM at a key vulnerability in the career pipeline.

*Second key benefit:* Rather than reinventing ways to reach out to underserved stakeholders with each new scientific project, this provides a forum for communities to directly communicate their needs to an expert network.

This clearinghouse would provide a way for expert scientists who may require remote work, are displaced, or have left the workforce for shorter time periods and have resume gaps, and are finding re-entry to academia or industry difficult, an alternative venue for continuing work in a transition period or on a part-time schedule. These types of persons include: 1) women leaving STEM after finishing a PhD or Postdoc, which is a particularly vulnerable period due to career breaks that coincide with family planning, changes between academia or industry, and/or dealing with the common "academic 2-body problem", 2) those with multiple postdocs who also face limited academic opportunities and have a progressively harder time finding tenure track or industry positions, 3) those who are trying to make career transitions to industry or policy from academic spheres and lack the expertise or training in those specific sectors, 4) displaced scientists that are not in permanent positions and want to avoid resume gaps and can provide expertise to short-term projects, or 5) those with limitations or disabilities that require remote/flexible work conditions.

This program would also provide communities, businesses, and academic research groups with short-term contracting services and expertise that may not be feasible or cost-effective for major consulting agencies to take, academic projects that require longer-term positions (i.e. postdoc or PhD student) to justify funding expenses, and limited projects that may not constitute basic research (and is therefore not applicable for NSF or related funding).

NSF would provide the virtual network infrastructure through existing CoPe HUBs through which communities and underserved groups would access expertise that have been peer-reviewed and are known experts in their field.

Benefits to underrepresented scientists:

- Reducing the risk of career breaks by providing a mechanism to fill resume gaps, maintain skill sets, and keep professional networks up-to-date
- Integrate non-traditional workers (i.e. remote workers, non 9-5 workers, those with limitations or disabilities, etc.).
- Provides a network of professional mentors that can not only be accessible to leaky STEM, but new graduated students or PhDs that are looking for transitions to alternative non-academic careers

Benefits to underserved stakeholders:

- Gives small communities, businesses, and nonprofits access to expert knowledge that would be unaffordable/inaccessible to directly solve problems
- Establish connection to underrepresented groups in the community to be able to directly communicate their needs to experts who can help them address specific, local problems.
- Enable first responders, emergency managers to access specialized hazard knowledge - i.e. plan for more extreme wildfire event in community due to an ongoing drought or climate change
- Allowing research or industry labs the flexibility of research scientists without hiring full-time postdocs or PhD students
- Provide grants to undergraduate-serving institutions to acquire specialized help that can advance mentoring of undergraduate research
- These experts are instantly accessible collaborators that are not limited by institutional, agency, or company structures and whose expertise has been vetted by peer-review processes though NSF hubs.
    - How are they vetted? Provide known verification to NSF to apply to participate in the clearinghouse and be listed in the expert database.
    - Known expertise is not only measured by PhDs, but can also include other terminal degrees or work experience.
    - Incentive or encourage communities, agencies, etc, that use this service to also intermittently provide expertise evaluations from their specific perspective
- People who want to remain in academia still have means to publish or work on projects with publishable results without an academic or research position
- Flexible scientific contracts can bring highly interested and educated people specifically to the CoPe program

How might funding for this project work?

- Local funding in smaller pots of money -> Community puts up a bid or a community provides a budgeted dollar amount and requests expertise who fit the budget and time-frame of project
- Individual scientists advertise expertise and rates, for when problem being addressed is not defined in a way that is conducive to a project-based budget.
- NSF can provide funding so academic research groups may also access this short-term talent, such as prioritizing grants or giving bonuses (SEED grant funding) for working with these scientists to incentivize collaboration and projects to expand.
- NSF also provides funding for short-term internships or fellowships for graduating students who want to explore alternative careers, especially in agencies, policy or industries that have a high barrier to entry.

***What is the reasoning or supporting evidence behind it, if any?***

Academic research that examines the "leaky pipeline timing" indicates that it is more likely to affect scientists in the immediate post-PhD period transition period to tenure track positions. The gap between men and women in the transition to bachelor's degrees has narrowed in recent years, but women remain less than a quarter of professors despite making up almost half of PhD graduates, according to NSF statistics (Nature). Family formation (marriage, childbirth) accounts for the largest "leak" on the career track from PhD to academia (Goulden et al., 2011, Family formation - Keeping Women in the Science Pipeline).

Due to the excess of PhDs and postdocs, there are not enough academic positions to match the number of doctoral graduates or those who have had multiple postdocs to fill. According to the NSF 2014 Doctorate Recipients from U.S. Universities report, the percentage of doctorates in STEM that continue on to academic programs in their first postdoctoral position is below 50% for most disciplines (15% for engineering and 29% for life sciences).

Women face structural barriers in hiring and salary that contribute to attrition. A 2012 study found that for identical male and female resumes for a lab manager position, the male applicant was rated as "more competent and hireable" and offered a higher starting salary (PNAS). This issue can be mitigated by giving women expanded opportunities to put themselves in front of potential employers and gain relevant experience in our consulting platform.

What prevents this from happening now: if you have to be the person who markets yourself to a huge range of stakeholders, you don't know the stakeholders, there's not a network and it turns into a marketing problem and connection problems. Local communities also often lack ability to vet - don't know enough about credentials to evaluate whether someone is really an "expert." This provides the opportunity to develop a network through which people can market themselves directly to those who might require their services

This model already exists in the tech industry as a strategy to improve retention of mid-career women - offering "internships" for women returning from extended family leaves to refresh technical skill sets (Washington Post). In the case of academia, the skill set already exists, and we can broaden this concept to integrate a wide variety of marginalized groups as both expert sources and end users.

Model also exists in scientific community through groups like American Journal Experts (AJE) - Graduate students/PhD researchers provide feedback on journal articles, typically written by

scientists with English as a second language that would otherwise have difficulty accessing the scientific literature.