Future of Research

championing, engaging, and empowering early career researchers

Prospectus
Fall 2018

Future of Research (FoR) is a 501(c)(3) nonprofit organization **created for and by early career researchers** *to make the research enterprise more sustainable for future generations.*

Our mission is to **champion, engage, and empower early career researchers with evidence-based resources to improve the research endeavor.**

Who Are We?

Future of Research (FoR) is a 501(c)(3) nonprofit organization **created for and by early career researchers** to make the research enterprise more sustainable for future generations.

Our mission is to **champion, engage, and empower early career researchers with evidence-based resources to improve the research endeavor**.

Our governance structure consists of the Board of Directors[1] and the Advisory Board[2]. The Board of Directors is comprised of early career professionals with advanced research training, pursuing careers in academia, non-profit organizations and the private sector. Our Advisory Board consists of leaders across business and academic sectors who advise us on our organizational strategy.

We are the only organization of our kind and uniquely positioned to drive improvements to problems facing the next generation of researchers in the research enterprise.

Our Motivation

Our goal is to enable researchers to focus on solving the biggest problems facing society.

Academic research and training practices today are squandering the talents of early career researchers and scholars. Competition for research funds and academic positions is increasingly intense; there is an increasing reliance on shallow metrics of productivity and success to decide the distribution of these highly coveted funds and positions; and young scientists are expected to spend an increasing amount of time in systematically underpaid, and often undervalued, positions during prime years of their lives and careers. This model is unsustainable and is **neither maximizing the talents and potential of today's early career researchers, nor creating the environment necessary to attract tomorrow's best and brightest minds**. This is highly detrimental to science and society.

Our focus is on creating opportunities for early career researchers to change research for the better. We are working towards a system that is not stifled by hypercompetition, but rather that empowers early career researchers to maximize their ability to lead and make intellectual contributions.

We are focusing on human capital in the research enterprise. We seek to make the enterprise more efficient at solving problems, to increase the potential of researchers to succeed in all sectors of society, and to ensure that this system (largely funded by taxpayers) optimally benefits society.

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[1] http://futureofresearch.org/board-of-directors/
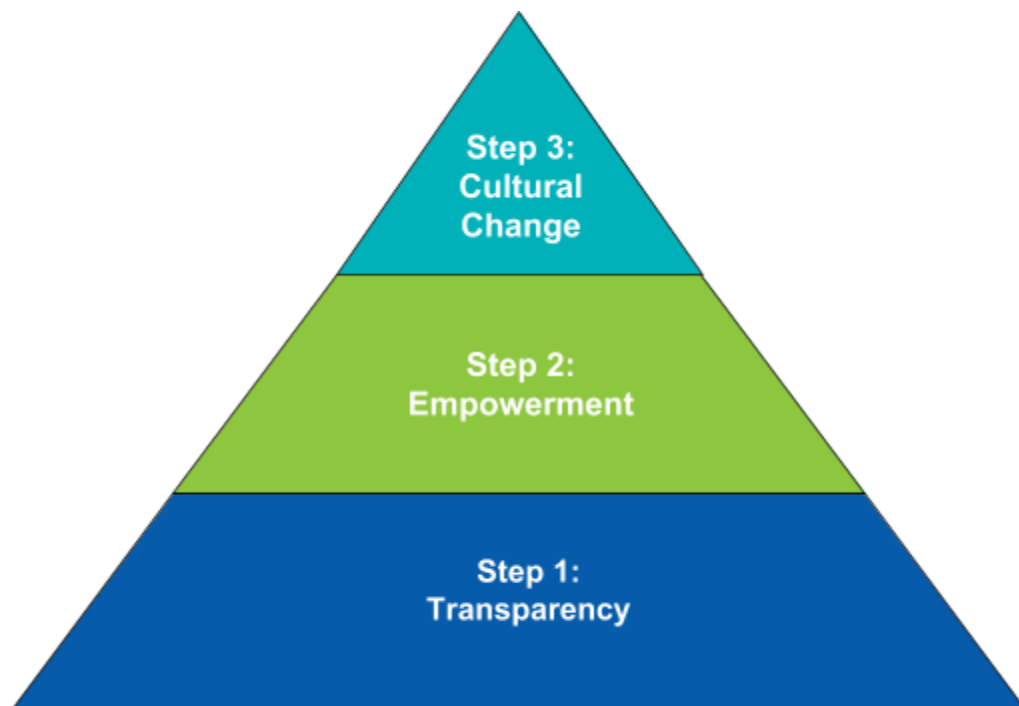[2] http://futureofresearch.org/advisory-board/

Our Strategy

Our strengths as an organization have been demonstrated through our efforts to date, and include:

- **Generating new ideas** through regular engagement across stakeholders and by carrying out rigorous research about the scientific enterprise;

- **Giving voice** to the concerns of the early career researcher community - capitalizing on the authority we have already built to disseminate our work and message widely, and to participate in enterprise-wide efforts to improve the system;

- **Independence** from traditional academic power structures via our status as a 501(c)(3);

- **Leading by example** by operating democratically and transparently as an organization.

How we move forward to effect change

We maintain a portfolio of key projects across three areas of focus:

- **TRANSPARENCY**: making data available and educating the community about issues affecting early career researchers.

- **EMPOWERMENT**: enabling early career researchers to make informed career decisions, to practice more innovative and independent research, and to advocate for a better research enterprise.

- **CULTURAL CHANGE**: pushing for implementation of formal changes to how the research enterprise operates, including changes to who holds the balance of power in making decisions, and fostering shifts in cultural expectations.

How we involve early career researchers in our efforts

We engage early career researchers through online discussions and in-person conferences that are led, and attended by, early career researchers.

Critically, we don't just discuss problems, but work with attendees to devise solutions, which we then enact through our our organizational projects and advocacy efforts.

We began this practice with our first meeting, issuing a white paper, "*Shaping the Future of Research: A perspective from junior scientists*"[3]. This paper called for greater transparency, connectivity, and funding opportunity for the next generation of researchers, and for further meetings across the country. So far, we have facilitated meetings in Boston, MA; New York, NY; Chicago, IL; San Francisco, CA; College Park, MD; Calgary, AB and Vancouver, BC, each with its own outcomes and resulting efforts, some described below.

Using academic talent and expertise to effect change

Our research efforts, meetings, and publications have established our reputation as an **independent, expert voice for early career researchers using evidence to push for change**. We have been recognized for this at the highest levels of the research enterprise, including as Science Career's People of the Year in 2015[4].

Key examples of our successes include a collaboration with researchers at the U.S. Census Bureau[5], which was cited by biotech organizations[6] in an open letter pushing against anti-immigration policies in the U.S. and which has helped to better define race, gender, marriage-status and age demographics within the U.S. biomedical workforce. Our President and Executive Director were the two youngest members to participate by invitation on the National Academies of Science, Engineering and Medicine Next Generation Researchers Initiative, mandated by the U.S. Congress under the 21st Century Cures Act[7]. Another member of our Board of Directors is the youngest member of the responsive working group at the National Institutes of Health.

Below, we lay out some key organizational achievements so far, and detail our plans for future action.

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[3] https://f1000research.com/articles/3-291/v2
[4] http://www.sciencemag.org/careers/2015/12/people-year-future-researchs-postdoc-activists
[5] http://www.nature.com/news/the-new-face-of-us-science-1.21229
[6] http://blogs.nature.com/tradesecrets/2017/02/07/us-immigration-order-strikes-against-biotech
[7] http://sites.nationalacademies.org/pga/bhew/nextgeneration/index.htm

Transparency

One of our major achievements in making the enterprise more transparent for early career researchers has been our research effort on salaries of postdoctoral researchers[8]. Postdoctoral researchers are *essential to carrying out research, providing expertise and performing the actual labor of research efforts*.

Salaries for postdoctoral researchers have remained persistently low, despite repeated recommendations to raise them among reports produced decade after decade by blue-ribbon panels. These recommendations aim to divorce cheap labor from training for the good of the enterprise, but low salaries also result in postdoctoral researchers being forced to leave, or not enter, academic research due to financial burden (for example due to the inability to afford the costs of childcare). **We believe that researchers should succeed on the basis of their intellectual ability, not on the basis of their independent financial stability**.

Increasing postdoctoral salaries could therefore help retain the brightest talent in academic research and improve the quality of the research enterprise, by removing financial burden as a selection factor.

To spur advocacy for increased postdoctoral salaries, we first gathered data and informed the community of how institutions were responding to a federal mandate to raise postdoctoral salaries, and assessed the likely impact of this change on the postdoctoral population. Institutions used our database to compare the responses of their peer institutions to this federal labor law[9] and to react accordingly. For example, **administrators at the University of Wisconsin-Madison used our resource to successfully advocate for salary raises**:

> *"The Future of Research (FOR) provided an extremely useful and unique informational resource for postdoctoral training institutions and individual postdoctoral trainees. ... the responsiveness and breadth of this resource was unique... for the first time, individual postdocs could easily compare institutional compensation policy in one place. … the University of Wisconsin−Madison campus made the decision to move forward with salary increases for postdoctoral employees."*

As well as assessing policies, knowing that institutions often struggle to simply count the current number of postdocs[10], we then used Freedom of Information requests to gather individual postdoctoral salary data from U.S. public institutions. **The first of its kind, this effort highlighted what postdocs were actually getting paid, whether institutions were able to provide this basic information, and whether this information was accurate and up to date.** We provided this data as an open resource on our website to support institutional and individual advocacy efforts[11], and allow independent analysis[12]:

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[8] i.e. doctorate-holding researchers.

[9] http://futureofresearch.org/flsa-and-postdocs/

[10] https://www.biorxiv.org/content/early/2017/12/01/171314

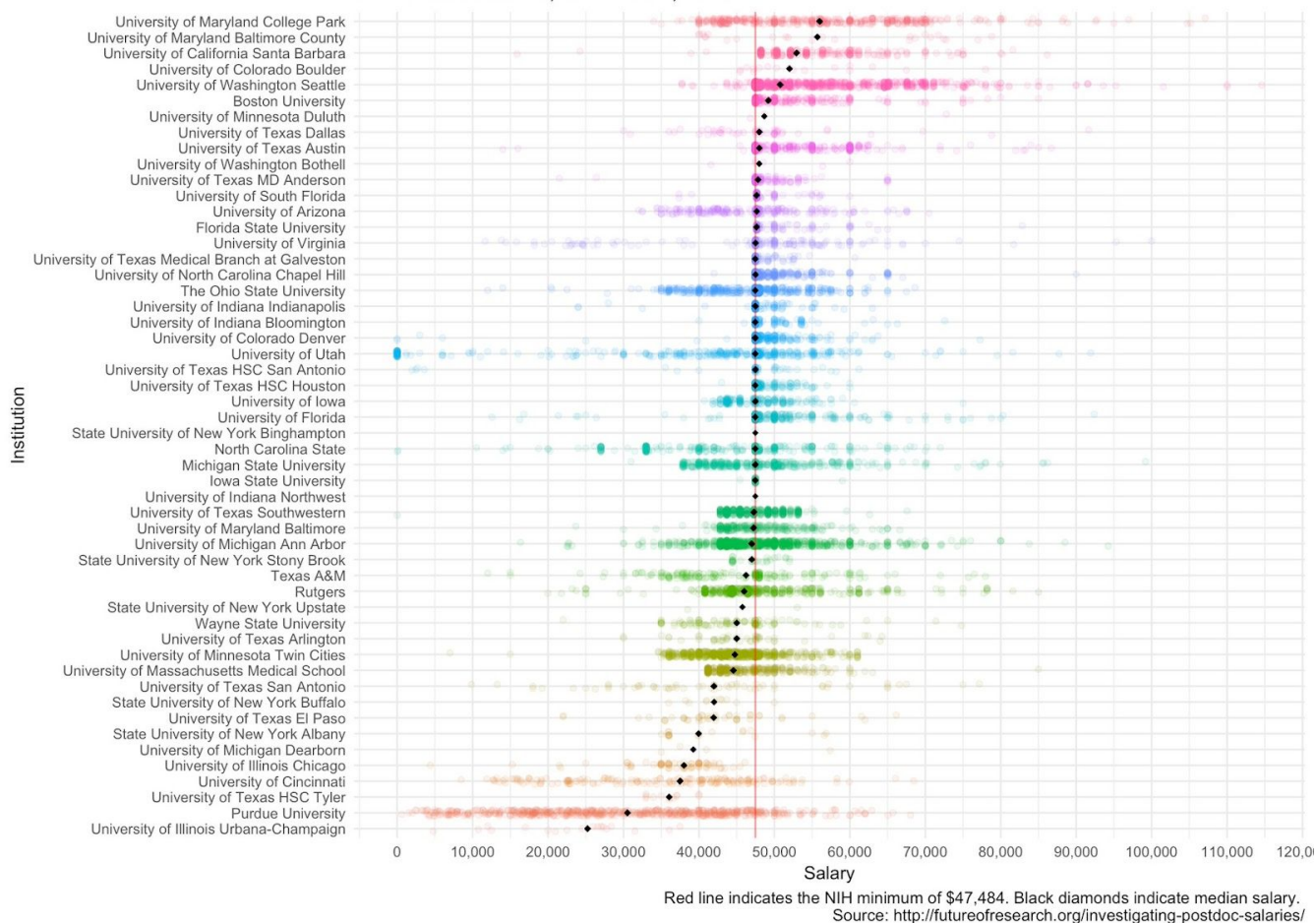[11] http://futureofresearch.org/investigating-postdoc-salaries/

[12] Plot by graduate student Drew Doerning, who also kindly shared the code for the plot publicly.

US Postdoc salaries, as of Dec 1, 2016

Red line indicates the NIH minimum of $47,484. Black diamonds indicate median salary.
Source: http://futureofresearch.org/investigating-postdoc-salaries/

We helped to create **postdocsalaries.com**, a resource for self-reporting of postdoctoral salaries[13], allowing comparison of salaries and benefits dating back to 2013. This resource is being used by early career researchers to make informed decisions regarding where to accept postdoctoral positions.

We have truly changed the conversation about salaries in academia. We strongly believe that money should not be a selection factor in who is able to pursue a research career.

To continue to build upon these efforts, we are planning to:

- carry out a yearly collection of postdoctoral salary data from public institutions, with expansion of efforts to partner with private institutions to include their data in our resource. Together this will lead to an unprecedented ability to follow trends in postdoctoral salaries over time.
- help graduate students and postdoctoral researchers advocate for recommended salaries[14] using advocacy campaigns, and by providing resources such as infographics adjusted for specific institutions/regions;
- gather and distribute individual stories of whether and how financial restrictions are driving early career researchers out of academia to illustrate the extent to which independent financial stability determines academic career progression.

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[13] https://postdocsalaries.com/

[14] http://sites.nationalacademies.org/pga/bhew/nextgeneration/index.htm

Empowerment

In order to adapt to a changing research environment, it is essential that early career researchers have a seat at the table in the organizations that control the research enterprise. However, few entities include, and listen to, the voices of early career researchers in such settings. This leads to a situation where many entities are unaware of issues being faced by early career researchers - such as gaining recognition for peer review efforts.

Recognition of early career researchers in peer review

What is the Problem?

Many early career researchers have experienced the phenomenon of peer review "ghostwriting" - carrying out peer review for manuscripts (often as a training exercise) without receiving credit for their work. The peer review report is instead received by the editorial staff with only the name of the invited reviewer attached.

It may be an unintended consequence of policies designed to protect confidentiality (specifically, that manuscripts should not be shared beyond the invited reviewer without prior approval), but the reality is that current cultural practices effectively result in plagiarism of early career scholarship, preventing their inclusion as fully-fledged members of the scholarly community.

How Will We Fix It?

We aim to promote the inclusion of co-reviewer's names at the time of review submission. We're currently working on achieving this goal through a project called #ECRPeerReview by:

- surveying the frequency of the problem;
- publicly identifying journals with favorable co-reviewer policies;
- partnering with stakeholders to develop best practices for journals to engage with co-reviewers; and
- advocating for the adoption of these practices across the enterprise.

This project will not only recognize the scholarship of ECRs; it will also help journals address a reviewer shortage and identify ECRs who could be added to their editorial boards.

This is just one of the issues experienced by the ECR community that the senior academic community was apparently not aware of - which is part of the motivation for our upcoming project, **Who's on Board?**

Who's on Board?

What is the Problem?

Most organizations in the research enterprise (universities, funding agencies, publishers, professional societies, etc.) give decision-making power to committees consisting solely of senior academics. It is therefore no surprise that the enterprise clings stubbornly to old models of training, mentoring, publishing and research, despite the evolution of workforce demographics, career expectations, and best practices over time.

The insights, energy, and vision of early career researchers can be leveraged to assist research entities in solving pressing issues within and outside the research enterprise. By developing young leaders, the research enterprise will also foster the next generation of informed, engaged stewards who will be positioned to adapt to future challenges.

Who's On Board? is seeking to place ECRs in positions of administrative and intellectual leadership within entities in the research enterprise. This includes boards and committees in funding agencies; publishers; academic institutions; non-profit organizations and scientific societies. The initial target for implementation will be **scientific and professional societies**, which present a high potential for impact for the following reasons:

- They are **engaged and influential** in policy discussions;
- They are wider communities, more **independent of the interests of specific stakeholders**, which may conflict with those of ECRs;
- Societies allow researchers to interact with one another **across career stages, institutions and countries**;
- **Some societies already have ECRs in their leadership**, providing strong social proof that change is desired, possible and beneficial.

It is *not sufficient simply to place early career researchers in these positions*: more effort is needed to support their leadership in societies. The **inclusion of a diverse population** in these positions is central to this project, championing equality across race/ethnicity, gender and geography, and making use of the fact that the majority of the diversity in academia comes from the early career population.

We envision a cultural shift away from the well-meaning concern that ECRs spending time in positions of service is in conflict with their scientific and career goals. Indeed, more experiences combining research with leadership are desirous. The need to expose ECRs to training for a variety of different career paths has been highlighted by initiatives such as the NIH Broadening Experiences in Scientific Training (BEST) program, for example.

Our ultimate goal is to normalize the presence of early career researchers in meaningful leadership positions across the research enterprise. Their participation is necessary to create a research enterprise more adaptable to their needs and to ensure the retention of diverse talent, reversing current trends of those from underrepresented groups leaving academia[15].

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[15] Gibbs Jr. et al., 2014: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0114736

How Will We Fix It?

Future of Research organized a meeting in Boston in the Fall of 2017[16] (supported by Boston University, Harvard Medical School, Pfizer, Addgene, and the Genetics Society of America) to initiate a strategy for carrying the Who's on Board? project forward. This meeting, and the subsequent efforts in the following months by the Board of Directors, led to the identification of the following factors that are key to our success:

- A campaign to celebrate the inclusion of ECRs in positions of power, and to evaluate the inclusion of ECRs in organizations.

- Training programs for ECRs to provide the skills (e.g. financial, procedural) necessary to hold and to thrive in these positions.

- An international action network of ECRs to exchange information, ideas, support and strategies to better serve their organizations and the research enterprise as a whole.

Using scientific societies as a model, we will then expand our efforts to other entities such as publishers and universities. We will provide resources to both institutions and ECRs and create a community of young leaders to support this change throughout the research enterprise.

We also aim to make it a cultural norm to distribute the burden of work on boards so that ECRs and underrepresented minorities would not be responsible for carrying out the majority of the work (often referred to as the "minority tax"). Finally, we will focus not on the token addition of ECRs to such roles but on ensuring that their voices are heard through sharing best practices and developing a sustainable action network of early career leaders.

This project will be launched in the Fall of 2018.

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[16] http://futureofresearch.net/boston-2017/

Cultural Change

Early career researchers face cultural barriers in academia to realizing their potential: the attitude that to leave academia is to "fail"; the perception that in order to be deserving of an academic position, it is necessary to suffer emotional, mental or financial hardship. These are rooted in the major cultural problem that training for, and recognition of, mentorship are not standard in academia. This has led to our desire to form a consortium to push for change in mentoring, and to begin exploring how to recognize and reward inspiring and ethical mentorship.

Mentoring Future Scientists

What is the Problem?

Academic research institutes have a fundamental responsibility to ensure that the early career researchers they train are set up for success. This must include both teaching technical proficiency in research and providing career development opportunities in a safe and inclusive environment. Studies on the effects of positive mentorship relationships on science trainees[17] have linked strong mentorship to "enhanced mentee productivity, self-efficacy, and career satisfaction [and is] an important predictor of the success of researchers in training"[18]. **It is critical to the development of a productive training environment**, particularly in an apprentice-like model such as is employed in academia, **that competent and appropriate mentoring is provided to allow the next generation to realize their potential**.

However, too often there are incidences of "mentors" acting as "*de*mentors" or "*tor*mentors". Institutions specifically designed to support mentorship and training are housing and at times shielding people who are undermining this effort, illustrated in the prevalence of sexual harassment and bullying of scientists in academia. In a recent National Academies of Science, Engineering and Medicine report it was found that sexual harassment in academia in the U.S. is at levels second only to the military[19]. **Mentors and working conditions in institutions are not just passively failing** to provide trainees with adequate support, but are **actively contributing** to a problem which widely affects trainees' feelings of safety, mental health[20], and productivity. These issues also **affect the diversity of the research enterprise**, because women[21] and underrepresented minorities[22] commonly receive less mentoring and experience more harassment. By promoting effective and appropriate mentoring, we have the potential to not only protect individuals from harm, but create a more inclusive environment, and a more productive research enterprise.

Efforts to overturn this mentoring landscape have struggled to succeed because the current incentives and rewards in academia are focused elsewhere in today's hyper-competitive funding environment.

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[17] https://insights.ovid.com/crossref?an=00001888-201304000-00028; https://www.ncbi.nlm.nih.gov/pubmed/27062425
[18] https://www.ncbi.nlm.nih.gov/pubmed/27062425
[19] https://www.nap.edu/catalog/24994/sexual-harassment-of-women-climate-culture-and-consequences-in-academic
[20] https://www.sciencedirect.com/science/article/pii/S0048733317300422
[21] https://www.ncbi.nlm.nih.gov/pubmed/15671328
[22] https://insights.ovid.com/crossref?an=00001888-201304000-00028

How Will We Fix It?

To draw attention to the importance of mentoring in institutions, we organized a meeting in College Park, MD in September 2017, supported by the Union of Concerned Scientists, BD Biosciences, University of Maryland College Park, Labmosphere, the Genetics Society of America and the American Society for Cell Biology[23]. The goals of the meeting were as follows:

- recognizing and discussing the issues surrounding mentoring in STEM fields;
- discussing effective mentorship and advocacy techniques at all career stages;
- inspiring participants to practice effective mentorship practices and promote these skill sets to their peers and colleagues at their own institutions.

As a result of this meeting key roadblocks to effective mentoring, which we seek to overcome with this project, were identified and discussed in our report[24]. **Our ultimate goal is to promote excellence in mentoring as a central priority of training institutions** to improve the quality of science produced by these centers. Greater mentoring competence will also create a research enterprise more supportive of the needs of ECRs and with the potential to retain a diversity of talent.

Exposure & Training	Incentives	Zero Tolerance & Accountability
Funding Agencies Mentoring philosophy statement requirements on grants. Continuing education and competency requirements.	Mentor awards that support and sustain research efforts. Money in research grants for mentoring improvement.	Provide clear, effective, and transparent channels for reporting harassment. No grant support for known predators/harassers.
Professional Societies Mentoring and diversity workshops and panels at meetings.	Awards and prizes for excellence in mentoring that are as prominently displayed, praised, and rewarded as research awards.	No tolerance policy for society members and at conferences. No scientific/leadership awards for known bullies/harassers.
Institutes Mentoring and diversity training required for **ALL** PIs with regular refresher courses.	Mentoring a priority in tenure and promotion decisions. Mentoring awards and prizes.	Establish channels for **SAFE** reporting. Transparently investigate. Appropriate accountability.

Call to action for funding agencies, professional societies, and institutes from our report. The main barriers to effective mentoring were recognized to be due to a lack of exposure to, and training in, best mentoring practices, as well as a lack of incentives for good mentoring, and accountability for negligent and toxic mentoring. We provide clear next steps for funding agencies, professional societies, and institutes to move towards actionable change to improve mentoring.

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[23] http://futureofresearch.net/college-park-2017/
[24] http://futureofresearch.net/wp-content/uploads/2018/09/InspiringandEthicalMentorshipinSTEM.pdf

Our initial aim is to organize a Mentoring Consortium which will meet to discuss how to take action. What effective mentoring looks like and whether positive mentoring is being practiced in research training environments are areas of active discussion. We intend to take advantage of the insights, energy, and vision of various stakeholders (from early career researchers to institutions and funding agencies) already undertaking research and discussions on improving mentoring practices, to bring about both bottom-up and top-down changes to the mentoring climate.

The quality of mentoring provided by individual PIs is relatively opaque to both potential mentees and the institutions that employ them. As a result, mentoring quality does not figure meaningfully into the incentive system for mentors. At the same time, efforts to establish a public "rate my professor"-like system for reviewing mentors have fallen short due to the highly sensitive and personal nature of the information. To address this problem, **we propose to utilize a trusted, third-party system that would enable trainees to securely and privately describe their mentoring experience.** This information will then be aggregated together to inform institutions and other audiences.

To do this, we will:

- Maintain a secure, private, third-party database of trainee feedback on mentors, using established instruments (ie developed by NRMN)
- Where data is relatively complete, announce Athena SWAN[25]-like awards for universities or departments that provide good mentoring experiences, or are improving
- Offer partnering universities anonymized notifications of concerning mentoring *patterns*, either longitudinal (by a PI over time) or lateral (in a department or among a population of students). This approach of aggregating multiple independent warnings is used by Callisto[26] to de-risk the reporting process for individuals.

Therefore, our aims are to:

- Catalyze the formation of, and convene meetings for, a consortium of interested stakeholders, drawn from (among others): funding agencies; academic institutions; professional societies; biotech; industry and organizations committed to collaborating on this project.
- Evaluate the implementation of the third-party proposal above, using the consortium meeting to engage stakeholders in determining the appropriate model for evaluation, and strategies for implementation within institutions.
- We will then utilize the results from this discussion to both implement a pilot project in "early adopter" institutions and evaluate mentoring quality using a third-party system.

Once we have the Mentoring Consortium established, we will be able to work to effect change in other aspects of the mentoring landscape. It is our ultimate goal to help early career researchers to find the right mentor, institution and funding opportunities to reach their desired goals and to help them realize their potential.

This project will be launched in 2019.

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[25] https://www.ecu.ac.uk/equality-charters/athena-swan/
[26] https://www.projectcallisto.org/

We Need YOUR Help To Realize This Vision!

How can you participate in improving the research enterprise?

- **Support the organization financially** in our goal to achieve change by developing resources and opportunities to empower early career researchers

- **Engage in major projects** contributing to the advancement of the enterprise through improved leadership and mentoring for early career researchers

- **Develop individual project components** that will allow for more direct impact and move the needle in favor of early career researchers

Please contact Executive Director Dr. Gary McDowell at futureofresearch@gmail.com to learn more about and discuss how you can support the work of Future of Research in effecting change!

Find out more at futureofresearch.org