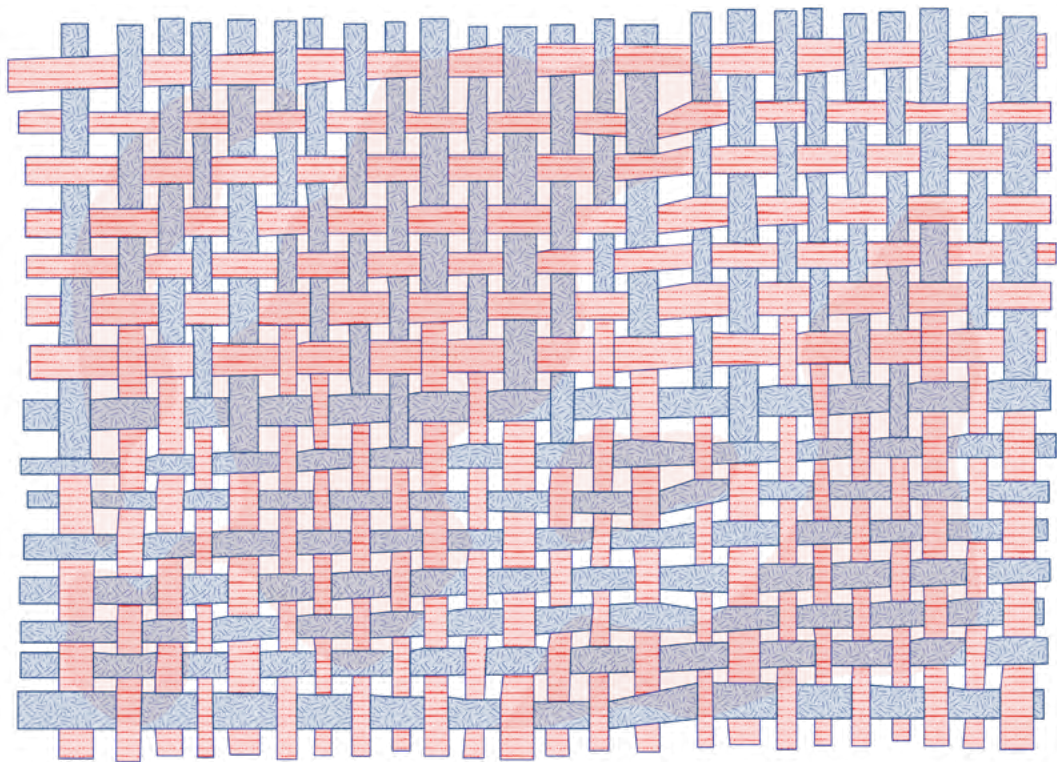


ESTABLISHING AN INCLUSIVE SCIENCE AND  
TECHNOLOGY POLICY FELLOWSHIP  
FOR THE COMMONWEALTH OF  
MASSACHUSETTS



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SCIENTIFIC  
CITIZENSHIP  
INITIATIVE  
AT HARVARD MEDICAL SCHOOL



The Scientific Citizenship Initiative (SCI) at Harvard Medical School is a lab for new curriculum and experiential learning opportunities for STEM graduate students. We create, test, and export innovative programs to enhance professional careers and elevate the depth and degree of meaningful interactions between scientists and society.

We believe science is at its best when scientists are active citizens, who listen and learn from many people and steer research to benefit everyone. SCI trains scientists to become responsible participants in their communities and strives to create a scientific culture that supports inclusivity, equity, cooperation, and service.

SCI envisions STEM students and fellows graduating with the societal awareness and skills to identify critical issues, challenge norms and to be leaders and allies in change. SCI envisions a new scientific culture of inclusion, made up of a network of institutions — both within and outside academia — working together to create a more equitable and socially responsive scientific endeavor.

For more information, please visit [sci.hms.harvard.edu](https://sci.hms.harvard.edu)

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## EXECUTIVE SUMMARY

In the summer of 2019, the Scientific Citizenship Initiative (SCi) at Harvard Medical School initiated a three-year pilot of the Massachusetts Summer Science and Technology Policy Fellowship (MASSTPF). This pilot placed STEM graduate students from Harvard University, and eventually the Massachusetts Institute of Technology (MIT), in a part-time paid summer fellowship where they worked as advisers to MA state legislators. The program was an experiential learning opportunity that allowed students to engage in dialogue with stakeholders and provided professional development applicable to a variety of careers. It also allowed state legislators to draw on the research skills and expertise of highly motivated students to improve their legislative work. Upon successful completion of its pilot, SCi now seeks to create a more inclusive and diverse fellowship program by expanding access to students across the Commonwealth of MA.

Technology is advancing rapidly, as are its societal implications. It is now more important than ever that academia trains students to use technological expertise to work at the interface of technology and policy in ways that advance the public interest. However, STEM graduate education focuses on a narrow set of technical skills required for careers in academia. Students rarely have the opportunity to gain real-world experience and engage with the societal implications of their work during their academic training. MASSTPF was created with this recognition and intentionally structured to create space for dialogue between STEM graduate students and policymakers, while also ensuring students are able to maintain their academic responsibilities.

In its final pilot year, SCi included two MIT students in the fellowship cohort through a partnership with MIT's Technology and Policy Program (TPP). This experience allowed SCi to begin to build the programmatic infrastructure needed to expand access to a broader set of students. Now, SCi now seeks to leverage Harvard and MIT's initial investments and create a phase two MASSTPF, which will include at least two additional partner universities. Such a pilot will allow SCi to continue to develop, test, and refine the additional scaffolding needed to scale the MASSTPF. The ultimate goal is to create an inclusive state-wide program open to any STEM graduate student within the Commonwealth of MA.

SCi has the knowledge and experience to increase access to MASSTPF and create fellowship cohorts that better reflect the population of MA. Legislators will have increased access to expertise to create evidence-based policy and benefit their constituents. With proper funding and institutional partnerships there is an opportunity to provide an important experiential learning opportunity that benefits both students and the development of policies that govern the great Commonwealth of MA.

## INTRODUCTION

Lawmakers increasingly face complex challenges in spaces where non-partisan scientific input is critical. Yet STEM education typically does not provide the understanding of public policy needed to engage with policymakers. This disconnect can lead policymakers to craft legislation that is not informed by the best available evidence and scientists to conduct outreach that can be counterproductive to their goals. When researchers and policymakers do work in collaboration, the former gains insight into the complexities of policymaking and the latter may change their attitude towards science, leading to more evidence-based policy (Crowley et al., 2022). State level science and technology policy fellowships can help foster such collaborations and train a new generation of scientists for careers in public policy.

Research suggests that state and local legislators are willing to update their beliefs in light of scientific evidence (Lee, 2022) and that STEM graduate students are increasingly interested in applying their scientific skills and expertise to careers in science policy (Hetherington and Philips, 2020). Unfortunately, only 0.5% of state legislators have backgrounds in science and engineering (Eagleton Institute of Politics, 2021) and STEM PhD programs rarely impart the skills required for careers in policy, such as science communication and leadership (Gigliotti et al., 2020) or how to wrestle with complex value-driven decision making (Garlick & Levine, 2017). Academia can help overcome these challenges and support meaningful engagement by providing STEM students with opportunities to develop these skills.

While workshops<sup>1</sup> and innovative curricula<sup>2</sup> can begin to address this training gap, success in science policy also requires experiential learning. Interviews of PhD-level scientists working in science policy revealed that the majority of the skills needed for a successful transition to this field were developed through opportunities such as science policy fellowships and internships (Guerra, 2020). The National Academies report on Graduate Education in the 21st Century specifically highlights the value of experiential learning (National Academies of Sciences, Engineering, and Medicine, 2018).

Unfortunately, there are very few chances for students to explore science policy in the field while still in graduate school. Existing programs in this space typically require students to either take a leave from their academic work, a non-starter for many PhD advisors, or to first complete their doctoral degree. State-level science and technology policy fellowships have the potential to address this problem and provide vital expertise to state governments. These fellowships exist in some states (see Appendix). Despite being home to many top tier universities, the Commonwealth of MA lacks such a program.

To address this gap, the Scientific Citizenship Initiative (SCi) at Harvard Medical School created a Massachusetts State House Summer Science and Technology Policy Fellowship (MASSTPF)<sup>3</sup>. MASSTPF placed Harvard STEM graduate students in the Massachusetts (MA) State House for 10 weeks over the summer to work part time as policy advisors to state legislators. The program recently completed its three-year phase one pilot, each year placing an increasing number of students in the State House. In its third programmatic year, SCi explored an expansion to include students from the Massachusetts Institute of Technology (MIT).

With data demonstrating the success of the phase one pilot program and growing demand from other institutions, SCi now seeks to use its institutional experience and programmatic infrastructure to create an inclusive and diverse state-wide MASSTPF accessible to all STEM graduate students in MA. The next step toward this goal is to conduct a phase two pilot that builds on Harvard and MIT's initial investments and doubles the number of participating universities by including students from two additional partner universities. This first and only state-wide science policy fellowship in MA, will not only benefit participating students, but has the potential to lead to evidence-based decision making that can improve the lives of citizens across the Commonwealth.

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<sup>1</sup> National Science Policy Network <https://scipolnetwork.org/>; American Association for the Advancement of Science (AAAS) Catalyzing Advocacy in Science and Engineering (CASE) <https://www.aaas.org/programs/catalyzing-advocacy-in-science-and-engineering>; AAAS Forum on Science & Technology Policy <https://www.aaas.org/events/aaas-forum-science-technology-policy>

<sup>2</sup> SCi Nanocourses <https://sci.hms.harvard.edu/index.php/introduction-to-science-policy-nanocourse/>, <https://sci.hms.harvard.edu/index.php/nano-course-series/>; SCi Science Communication Course <https://sci.hms.harvard.edu/index.php/science-communication-for-ethical-community-engagement/>

<sup>3</sup> <https://sci.hms.harvard.edu/index.php/ma-state-house-fellowship>

## MASSTPF FELLOWSHIP EXPANSION

State-wide expansion of the fellowship program would have three major benefits. First, it would satisfy the significant and growing demand from both students and legislators. SCi has received inquiries from students and potential partners at a number of nearby universities, including Boston University, Northeastern University, the University of Massachusetts Amherst, and the University of Massachusetts Medical School. In the final year of the phase one pilot, 11 MA legislative offices requested to host a fellow, but programmatic funding could only support six.

Second, expansion would increase the diversity of its fellows. Because STEM fields are not demographically representative across multiple dimensions, including but not limited to race, ethnicity, and socioeconomic status, a larger pool of applicants would allow for the creation of fellowship cohorts that better reflect the population of MA. Such cohorts will not only provide diverse perspectives for state legislative offices, but also have the ability to enrich peer-to-peer learning amongst cohort fellows, and result in a more innovative output (Lorenzo, 2018).

Finally, it would benefit the people of Massachusetts. Although several state governments use independent state academies of science as objective scientific resources, there is no such institution in MA (Schuerger et al., 2022). Fortunately, there are many top-tier universities throughout the Commonwealth that could provide the type of expertise found in state academies. Such expertise is most impactful when scientists have direct interaction with policymakers (Levine, 2021). A state-wide fellowship that draws on the expertise from across the Commonwealth and engages STEM graduate students with the State House has the potential to create the dialogues needed to produce high quality evidence-based policies.

The following sections of this report detail the structure of SCi's phase one pilot MASSTPF, review its initial partnership with MIT, and propose a phase two pilot that will build towards a more inclusive and equitable state-wide MASSTPF. SCi hopes this documentation will serve as a useful reference to engage the necessary stakeholders to create such a program.



## PHASE ONE PILOT STRUCTURE

The MASSTPF pilot placed graduate students in the MA State House for 10 weeks each summer. MASSTPF's inaugural year in 2019 had two fellows and grew to four and then six fellows in 2020 and 2021, respectively. Fellows committed to 20 hours per week, received a stipend, and were expected to maintain their regular academic responsibilities. The program was funded by Harvard Medical School through the 2019 Dean's Innovation Award in Education and the Systems Biology Department Building Bridges Program. The MASSTPF was directed by SCi's Executive Director, Daniel Pomeroy, PhD. Dr. Pomeroy's prior experiences in science policy include serving as a AAAS Science and Technology Policy Fellow and as the Managing Director and Senior Policy Advisor of the Policy Lab at the Center International Studies at MIT. MASSTPF logistics and implementation were managed by SCi's Program and Communications Coordinator, Josep-Andreu Palacios-Caballero, who comes from a communications background. The program scaffold summary below was improved through iterations of the experience and feedback. A more detailed outline is available in Table A.

## SELECTION OF FELLOWS

MASSTPF fellows applied through a competitive process that included both a written application and interviews with SCi's Executive Director and Program Manager and Communications Coordinator. Fellows were evaluated using a standardized rubric to analyze attributes such as clarity of written communication, alignment with future career aspirations, demonstration of humility for the limits of STEM knowledge in the production of public policy, and respect for diverse viewpoints. Admission decisions were reviewed by senior members of the SCi team prior to finalization.

Before fellows formally accepted an offer, they were required to meet with their academic adviser and develop a summer work plan. This meeting provided an opportunity to clarify expectations between trainee and mentor and resulted in a signed document. Topics included the time needed to participate in the program, priorities for research work for the duration of the fellowship, and mutually agreeable time management plans.

## MA STATE LEGISLATIVE OFFICE PLACEMENT AND RESPONSIBILITIES

MASSTPF fellows went through a matching process to find their host, either a legislative office in the MA House or Senate or a joint committee, where they undertook projects within the representative's or committee's jurisdiction. Typical responsibilities included researching science and technology-related policy areas, drafting reports and memos for hearings, and interacting with constituents and advocates. The 2019 cohort reported to the State House in Boston in person; however, due to the COVID-19 pandemic starting in 2020, the program was adapted for remote participation in 2020 and 2021.



## SCIENCE POLICY TRAINING AND MENTORING

Fellows were required to participate in an SCi-led fellowship orientation, and ongoing mentoring sessions. Orientation was a one-day workshop based on SCi’s Science Policy Nanocourse; it introduced the fellows to science policy and reviewed the fundamentals of the MA government. Fellows experienced policy decision-making through an interactive simulation and had the opportunity to ask questions to a panel of MASSTPF alumni (after the first year). This was a critical part of the fellowship since prior science policy experience is not a requirement for acceptance into the program.

The mentorship consisted of biweekly group meetings with SCi’s Executive Director and a volunteer external mentor with experience in science policy at the State House. The agenda of these meetings was set by the students and typically involved skill-building exercises. Mentoring sessions were strengthened by learning from the experiences of other fellows in the cohort. The mentors were also available for individual meetings if requested to discuss career paths or other issues. To encourage self-reflection and record progress, fellows dedicated one hour per week to a journal assignment where they responded to prompts on their progress as well as a more detailed self-reflection at the end of the fellowship. These journal entries included highlights and challenges, activities, and interactions. SCi staff reviewed the journals on a weekly basis to flag and address any potential problems as they arose.

## PROGRAM EVALUATIONS

At the end of each year, SCi conducted evaluations to gauge the effectiveness of the program and highlight areas that can be improved in the future. SCi requested feedback from the fellows, the host offices, and the fellows’ academic advisors. The fellows were asked to comment specifically on how their experience influenced their understanding of science policy and career options in the field. Fellows’ feedback was collected through an anonymous online form to ensure confidentiality and data accuracy. The host offices described the utility of hosting a fellow and whether they would participate again; the academic advisors confirmed that the students were able to maintain a satisfactory level of progress on their graduate work over the 10 weeks. To determine MASSTPF’s impact beyond the 10-week period, SCi plans to conduct long-term evaluation in the future.

## PILOT EXPANSION: MIT PARTNERSHIP

As a result of the success of MASSTPF in its first two years, and significant interest from students outside of Harvard, SCi expanded the program in 2021 to include two graduate students from MIT through MIT's Technology and Policy Program (TPP)<sup>4</sup>. As MIT does not host its own State House fellowship, this partnership provided an experiential learning opportunity for these students at a low cost to the institution. This partnership also allowed SCi to evaluate and begin to identify ways MASSTPF could be expanded to include other MA academic institutions beyond Harvard.

The partnership was initiated with the drafting of an agreement between SCi and TPP stating that TPP was responsible for financially supporting two MIT fellows, screening initial applications, and submitting four nominations for SCi to decide the final MIT fellows. SCi then incorporated the two MIT fellows into the Harvard cohort. There was no distinction in fellowship expectations between the fellows from Harvard or MIT. Creating a cohort spanning these two institutions proved successful in that all fellows reported an effective and impactful science policy fellowship experience and MIT maintains interest in future participation in MASSTPF.

Throughout this partnership, SCi identified minor administrative changes (discussed below) that would streamline the process and will incorporate those changes in future iterations of the fellowship. Further expansion will require thoughtful attention to the specifics of partnership with different institutions where contexts will vary, including financial resources, academic preparation and expectations, and logistical constraints. Successful navigation of these challenges will help to ensure that each fellow and cohort flourishes.

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<sup>4</sup> <https://tpp.mit.edu/>

## IMPACT OF MASSTPF PHASE ONE PILOT

SCi has collected and analyzed evaluation data from fellows, host offices, and academic advisors over the pilot years. Every group reported extremely positive experiences with the program. All fellows found that SCi had sufficiently prepared them for the fellowship and that the experience itself was relevant to their career development. When surveyed, the fellows agreed that MASSTPF significantly increased their understanding of the role values play in science policy. Also, the host offices unanimously stated they would host a fellow again the following year and would recommend the program to a colleague. One host office wrote “[Our fellow’s] larger project was on a topic that I care a lot about (and our office typically takes the lead), but his unique approach and experiences meant we will soon be filing legislation based directly on that research.”

The journal reflections also served as a point of program evaluation. One MIT student stated in their final journal reflection: “It’s incredibly difficult to get real-world experience in science policy as a graduate student, especially in science, which usually makes it difficult to know whether this is a path worth pursuing after graduating; this experience has been incredibly insightful into what a career in science policy could actually look like.” Several fellows directly wrote that they plan to continue with science policy during and after graduate school as they became aware of the benefit of science in public policy, with one noting: “This has solidified for me that having a role in policy and legislative decisions is important to me regarding science, whether it is my own science or someone else’s. I want to be sure information gets to people quickly and in the most accurate and understandable way so that informed decisions can be made.”

SCi will monitor the long-term effects of MASSTPF to improve the program and acquire funding. For instance, it will be important to know if any legislation is successfully implemented based on the research and work of a fellow. Another indication of program success is whether fellows advance into science policy-focused careers; for example, an alumnus of the pilot program continued their training as an AAAS Science and Technology Policy Fellow, a prestigious program at the national level. Such records are strong evidence that MASSTPF benefits the fellows as science policy education and career development. They also illustrate how this science policy fellowship directly impacts and progresses the legislative process.

## TOWARD A STATE-WIDE MASSTPF

The long term goal of the MASSTPF is to include STEM graduate students from across the Commonwealth of MA. A fully inclusive state-wide fellowship would allow for any MA STEM graduate student to apply with SCi serving as the centralized administration. Such a program would require significant funding, staff resources, and programmatic infrastructure that has yet to be developed. Therefore, the logical next step is to build upon Harvard and MIT's initial investments to create a phase two pilot that moves SCi toward that ultimate goal.

### PHASE TWO PILOT

In a phase two pilot SCi would attempt to develop two additional partnerships, thereby doubling the number of institutions involved, and increase the cohort to 8 fellows. After finalizing these partnerships, each institute would field applications from their students based on SCi's evaluation rubric and then submit fellow nominations to SCi. Each partner institution would be responsible for providing the funds to support their fellow(s) and to cover a portion of administration costs. For schools who are not able to support the program with internal funding, it may be possible to apply for joint funding opportunities with SCi.

This next step is logistically practical for the near future and allows SCi to develop, test, and refine the additional scaffolding needed for an inclusive state-wide MASSTPF. Specifically, SCi would 1) develop an expanded recruitment strategy using best practices in inclusive recruiting, 2) create a selection committee to reduce bias in the fellow interview and selection process, and 3) increase the number of mentors to account for a larger cohort. Piloting each one of these components on a relatively small scale will provide valuable experience that can be used to scale up to a state-wide program.

The proposed phase two pilot is similar to the Virginia's COVES Policy Fellowship<sup>5</sup>. The Virginia Academy of Science, Engineering, and Medicine (VASEM) hosts the program, but relies on Virginia universities and additional sponsors to fund the fellows. The participating universities initially screen applicants and send their top nominees to VASEM for the selection of their respective fellows. The long-term state-wide goal is analogous to the Rappaport Institute for Greater Boston at the Harvard Kennedy School, which hosts a 10-week summer Public Policy Summer Fellowship<sup>6</sup>. The Rappaport Institute recruits students from universities in and near Boston and is responsible for fielding all applications and funding fellows.

SCi is in the process of establishing partnerships with more MA academic institutions who are eager to participate and fund a fellow. Building the fellowship in the phase two pilot will allow for immediate and continued expansion. However, looking forward, SCi is prepared to evolve MASSTPF into a state-wide fellowship when the required resources are available. An outline of MASSTPF’s structure in both pilot phases and the state-wide program can be found in Table A.

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<sup>5</sup> <http://www.vasem.org/covesfellowship/>

<sup>6</sup> The Public Policy Summer Fellowship through the Rappaport Institution is for public policy graduate students whereas MASSTPF is for STEM graduate students. <https://www.hks.harvard.edu/centers/taubman/programs-research/rappaport/student-opportunities/public-policy-summer-fellowship>

Table A:

# THE EXPANDING STRUCTURE OF MASSTPF

The table below describes the major programmatic components of the MASSTPF pilot and indicates how they would be modified in a phase two pilot and ultimately a state-wide program.

	PHASE ONE PILOT	PHASE TWO PILOT	STATE-WIDE PROGRAM
RECRUITMENT	<p>SCi recruited graduate students</p> <ul style="list-style-type: none"> <li>• Email graduate programs</li> <li>• Contact student interest and identity groups</li> <li>• Hang flyers around campus</li> </ul> <p>SCi recruited host offices</p> <ul style="list-style-type: none"> <li>• Contact relevant legislative offices</li> <li>• Meet with potential offices to discuss project topics</li> </ul>	<p>Partner institutions recruit their own students and SCi advises this process, providing advertising material and outreach strategies centered in best practices in inclusive recruitment</p> <p>SCi recruits host offices</p>	<p>SCi recruits students at institutions across MA using best practices in inclusive recruitment</p> <p>SCi recruits hosts offices</p>
FELLOW SELECTION	<p>Students submitted application materials (CV, statement of interest, and signed conflict of interest statement) to SCi</p> <p>SCi interviewed select applicants and then finalized cohort</p>	<p>Student submit their application materials to their home institution</p> <p>Home institutions screen applications and submit nominations to a selection committee</p> <p>The selection committee reviews applications and finalizes cohort</p>	<p>Students submit application materials to SCi</p> <p>A selection committee reviews applications and finalizes cohort</p>
WORK PLANS FOR EXPECTATIONS	<p>SCi required established and written expectations between fellows and their academic advisors for the fellowship</p>	<p>Partner institutions are responsible for establishing and documenting fellow-academic advisors expectations</p>	<p>SCi is responsible for establishing and documenting fellow-academic advisors expectations</p>
MATCHING PROCESS	<p>Fellows interview with all host offices</p> <p>Fellows and host offices rank preferences and SCi calculates optimal arrangements</p> <p>Fellows co-create a summer work plan with their host office</p>		
ORIENTATION	<p>SCi provides an interactive a one-day science policy training</p>		
MENTORING	<p>Mentors meet bi-weekly with fellows and are available for individual meetings</p>		
JOURNALS	<p>Fellows record their experiences one hour per week and write a more reflective entry at end of fellowship</p> <p>SCi reviews journals to identify and address any potential problems</p>		
EVALUATION	<p>SCi sends final evaluations to the fellows, host offices, and the fellows' academic advisors</p> <p>SCi uses feedback to assess and improve the fellowship program</p>		
LONG-TERM EVALUATION	<p>SCi will maintain an active database of MASSTPF alumni and will contact them every five years with a survey. Select alumni will be further qualitatively interviewed</p>		

## EXPANSION CHALLENGES

Expanding administrative responsibilities is not particularly challenging as these scale linearly with the number of fellows supported and therefore, predictably require corresponding increases in staff time. For example, SCi will have to conduct additional legislative office recruitment, fellowship application reviews, and evaluations in alignment with the number of fellows participating in the program.

The most significant administrative challenge within MASSTPF will be modifying the mentorship program. At present, all fellows participate together in mentoring sessions with SCi staff and external science policy mentors, but these sessions will become less efficient as they grow. In larger groups, fellows will receive less feedback or interaction with their peers or mentors. Likely, SCi will have to recruit additional mentors and break down the fellow cohort into mentoring groups. Advantageously, this growth would strengthen the group mentoring sessions as a more diverse cohort would provide different viewpoints and experiences. At any number of fellows, mentors need to be available for one-on-one mentorship sessions as desired; these interactions are a meaningful aspect of the fellowship experience.

The most significant long-term challenge will be identifying and maintaining the funds to cover the administrative responsibilities of the fellowship. Achieving this goal will either require a large centralized fundraising effort or the inclusion of overhead costs to partner institutions. Partner institutions may need to also find external funds to finance their PhD student fellow; SCi could serve as a partner in identifying funding sources to achieve this goal.



## DIVERSITY, EQUITY, AND INCLUSION

SCi aims to continuously improve all of its programming to address issues of diversity, equity, and inclusion (DEI). Through its phase one pilot, SCi identified multiple barriers that successively limit equitable access to training in science policy careers.

It begins with the fact that STEM education suffers from a lack of diversity across multiple dimensions. Next, because STEM graduate education focuses on a narrow set of technical skills required for careers in academia, students must gain real-world experience through extracurricular activities. In MA there are no paid S&T policy fellowships at the state level open to all students. Therefore, students need to learn these skills through unpaid activities, which limits access to those with the means needed to take on such work. Even then, given the geographical layout of universities in MA, students without access to reliable transportation would not be able to participate in even unpaid internships at the MA State House.

The phase two pilot will work to address each of these barriers. Though the broader STEM graduate population may not yet be representative, we can create a diverse cohort by expanding the potential applicant pool, targeting our recruitment efforts to underrepresented communities, and creating a diverse selection committee to reduce bias in evaluating applicants. By providing paid stipends we will reduce barriers for lower-income students. Through remote work options developed during the pandemic and by providing travel reimbursements, we will address issues of geographical constraints. Additionally, SCi will improve the mentoring process, ensuring at least one mentor comes from a historically marginalized background and providing mentor stipends to fairly compensate for their time.

## CONCLUSION

Scaling MASSTPF beyond Harvard and MIT has the potential to impact the careers of STEM graduate students across the state. It will especially benefit students from resource-constrained institutions where they may not have access to career training programs in science policy. The phase one pilot partnership with MIT successfully demonstrated that a more inclusive MASSTPF is possible. Now, SCi is prepared to conduct a phase two pilot that will expand partnerships and provide the experience to move toward the goal of a truly inclusive state-wide MASSTPF.

Beyond career training, expanding MASSTPF will develop new leaders in the state-level science-policy domain. As of 2021, only four MA legislators are STEM-affiliated professionals, three representatives are healthcare professionals and one representative has a PhD in Engineering (Eagleton Institute of Politics, 2021). Scaling the fellowship will directly increase the number of STEM professionals working in the State House. The resulting dialogues between scientists and state policymakers have the potential to improve state policy to the benefit of all MA residents.

With thoughtful strategic partnerships, SCi has the ability to demonstrate its commitment to centering equity and inclusion in its programming. SCi hopes to use its experience to increase access to this invaluable science policy training experience to as many students as possible and to contribute to evidence-based policy for the benefit of MA lawmakers and constituents alike. MASSTPF expansion would install the first and only state-wide science policy opportunity for STEM graduate students in MA, an appropriate addition for the science and technology-forward state.

APPENDIX:

LEARNING FROM OTHERS

Multiple science and technology policy fellowships currently operate at both the national and state level (Diasio, 2020). The oldest and most recognized program is the American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellowship<sup>7</sup>. Since 1973, AAAS has placed PhD fellows in the legislative, executive, or judicial branch of the US federal government for a year-long fellowship. Long-term data shows both the AAAS fellows and host offices involved benefit mutually: the fellows reported a significant increase in their policymaking knowledge and understanding the role of science in policy, and host offices are able to take on and complete projects that would not have transpired otherwise (Cohen 2020). After their experience, many AAAS fellowship alumni choose to direct their career toward the intersection of science and policy (Cohen 2020).

The demonstrated success and impact of the AAAS fellowship has inspired the genesis of analogous programs at the state level. At present, including MASSTPF, there are 10 states with established fellowships and approximately 20 other states with programs in consideration. Every month, representatives from these programs meet virtually to share goals and strategies to develop and improve their fellowship. The discussion topics range from employing best evaluation practices to ensuring financial security to recruiting applicants. SCi regularly attends as this supportive community is an invaluable resource to those looking to start or expand a fellowship in their state.

Members of this collaborative group recently released an updated report entitled “Elements of a Successful Science Policy and Technology Policy Fellows Program for State Government”, originally written in 2016 by the California Council on Science and Technology (CCST) (California Council on Science and Technology, 2016; Owen et al., 2022). This report serves as a reference from those looking to build a science policy fellowship. It thoroughly outlines the currently active programs, essential considerations for designing and launching a program, and the important aspects of program management and improvement. Although SCi has already implemented the majority of their recommendations, there are several aspects that will be added to the MASSTPF framework such as an advisory board, designated program champions, and an alumni network. This report will serve as a guide as SCi increases funding resources and continues to expand and improve, citing other successful state-level programs

Interestingly, no two of the 10 currently active state-level science policy fellowships follow the exact same model, for example:

- The California Council on Science and Technology (CCST) Science & Technology Policy Fellows Program<sup>8</sup> is a year-long program and open to PhD scientists and engineers across the country. Over the past 10 years, the CCST fellowship has garnered a reputation for its success in retaining more than half the fellows in the California State House (Alberts 2018).
- The Eagleton Science and Politics Fellowship<sup>9</sup> began in 2017 and is coordinated by the Eagleton Institute of Politics at Rutgers University. Doctoral-level healthcare professionals and STEM PhD Science Fellows are placed in the executive and legislative placements in the New Jersey state government for one year to support officials in making evidence-based decisions in STEM public policy areas.
- The Commonwealth of Virginia Engineering and Science (COVES) Fellowship<sup>10</sup> is hosted by the Virginia Academy of Science, Engineering, and Medicine (VASEM) for STEM PhD students or postdoctoral fellows full-time for 12 weeks. Virginia public universities sponsor their fellow(s), and VASEM selects and provides funding for a fellow from a Virginia historically black college and university (HBCU) or historically excluded community to promote diversity, equity, and inclusion, all integral aspects of an outstanding and effective program.
- The Texas Science Policy Fellows pilot program<sup>11</sup> was initiated in 2021 in collaboration with Rice University’s Baker Institute for Public Policy Science and Technology Program and The Academy of Medicine, Engineering & Science of Texas (TAMEST). Similar to MASSTPF, the PhD student fellows are part-time for three months, however in this pilot year the Texas fellows worked with a nonprofit organization in a collaborative effort, instead of on individual projects (The Academy of Medicine, Engineering & Science of Texas).

Despite the variation in fellowship models, there are three fundamental components shared across state-level fellowship programs: a host organization, a relationship with the state government, and sufficient funding to both cover the administrative work of the program and stipends for participants. Often the host organization is a university, state academy, or a combination of both. The necessary relationship with the state government can be

formal through legislation or informal through the participation of individual members. Fellowships can be funded by a variety of sources such as universities, foundations, state funding, grants, and donors.

For example, in 2016, CCST awarded grants to teams from nine states, including MA, to start programs in their home state through funds from the Simons Foundation and the Gordon and Betty Moore Foundation (California Council on Science and Technology, 2017). This money was received by Nathan Philips, professor at Boston University and former CCST fellow, and has been used towards the scoping phase of a statewide fellowship program. Sci maintains a collaborative relationship with Dr. Phillips and Boston University, allowing for an expansion of the MASSTPF to incorporate his work.

The Gordon and Betty Moore Foundation, along with the New Jersey state government, also supports fellows of the The Eagleton Science and Politics Fellowship. The Chan Zuckerberg Initiative provided grants to fund fellowships in Virginia, Missouri, and Idaho (Chan Zuckerberg Initiative, 2020). In Virginia, the central initiative supports their HBCU or historically excluded community fellows, while the other students are supported by their home institute as mentioned above. This variety and generosity of funding sources for science policy fellowships indicates enthusiasm for these training programs.

Traditionally, science policy fellowships were designed as year-long and full-time postdoctoral opportunities, excluding graduate students. However, through modifying the fellowship to be part-time or shorter in duration, it is feasible for students to gain science policy experience without significantly interrupting their graduate work as seen in Virginia and The Christine Mirzayan Science<sup>12</sup> and Technology Policy Graduate Fellowship Program at the national level. MASSTPF has adapted this model to accommodate graduate students who are passionate about science policy and want to incorporate this training into their graduate education.

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7 <https://www.aaas.org/programs/science-technology-policy-fellowships>

8 <https://ccst.us/ccst-science-fellows-program/>

9 <https://eagleton.rutgers.edu/eagleton-science-and-politics-initiative/>

10 <http://www.vasem.org/covesfellowship/>

11 <https://www.ricescipol.com/texas-science-policy-fellows>

12 <https://mirzayanfellow.nas.edu/>

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