

**Elements of a Successful Science and Technology Policy
Fellowship Program for State Legislatures**



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Table of Contents

Executive Summary	3
Purpose	6
Introduction	6
Approaches to Science Advising	7
A Partnership for Science Advising- How California is Tackling the Challenge	8
Qualitative Successes	9
Quantitative Successes	11
Lessons Learned.....	11
Criteria for an Effective Program at the State Level	13
Elements of Effective Program	16
Conclusion	19

Elements of a Successful Science and Technology Policy Fellowship Program for State Legislatures

Executive Summary

This report responds to a request from the Gordon and Betty Moore Foundation to the California Council on Science and Technology (CCST)¹ to summarize attributes that were necessary for launching a distinguished state-level science advising policy fellowship program. This document assesses the important factors to consider when evaluating other states where such a program may be established, and the essential elements of a successful fellowship program. This report is largely based on CCST's own experience and deep expertise with its California-based Science and Technology Policy Fellowship with input from the National Conference of State Legislatures (NCSL) and other key CCST advisors.

The Challenge

State legislators and policymakers face a wide variety of issues involving science and technology. In California – and elsewhere – it has been increasingly valuable and important for lawmakers to have access to scientists and engineers who can help inform legislation that will successfully support a state's long-term policy goals and benefit its residents. A science advising mechanism can provide legislators with expedient advice and analyses on current science and technology-relevant policy issues to enable evidence-based decision-making.

The California Model

California now has a proven solution to meet the need of state legislators and policymakers that has increased their access to unbiased scientific and technical information to enhance decision-making. Each year, approximately ten CCST Science and Technology Policy Fellows – highly trained scientists, engineers and clinicians with PhD, MD or equivalent degrees – are placed in the California State Legislature to serve alongside legislative staff. Beyond bringing specific technical knowledge to decision-makers, these individuals bring a “scientist's mindset” to policy discussions, including a spirit of inquiry and constructive questioning, quantitative analysis, and an ability to rapidly learn new scientific and technical information on topics that reach far beyond the scientists' academic training. Furthermore, these individuals create a bridge to many other scientific experts within the individuals' network and further afield. The Fellowship program has the added benefit of providing policy training to scientists and engineers, which they can apply in their future careers.

¹CCST is a nonpartisan, impartial, not-for-profit corporation established via Assembly Concurrent Resolution (ACR 162) in 1988 to provide objective advice from California's best scientists and research institutions on policy issues involving science.

Following a third-party analysis of opportunities and gaps for science advising in Sacramento, CCST launched the Science & Technology Policy Fellowship program in 2008 with a six-year budget of \$7.2 million. Grants were provided by the Moore Foundation and other funders.² The initial funding supported a year of organizational effort to establish the program and five years of annual Fellowship activities. The belief was that state policy that has a science and technology component could be aided by having people in the Legislature who understand and can effectively translate the science to a non-scientist.

California is unique in many ways, including the way their state government is structured. States that are contemplating the launch of a similar program should consider ways to adapt California's model to fit their particular needs.

Criteria for an Effective State Legislature Program

CCST recommends evaluating the existence of or potential for the following components when considering the launch of a new science and technology policy fellowship in another state:

1. **Champions for a policy fellowship program.** Strong champions are needed from both within and outside the legislature who can galvanize support for a fellowship program.
2. **To manage the program, a host organization dedicated to improving the engagement between scientists and policymakers.** From recruiting, selecting, and training the highest quality fellows to establishing and maintaining excellent relationships with legislative leadership, the organization's role in establishing and building the fellowship's reputation, brand and longevity is central. The organization would manage many other day-to-day operations of a fellowship program as well.
3. **Funding sources.** Sustained funding is essential to grow the program's visibility and reputation. A variety of broad and diverse funding sources is helpful for a program to demonstrate its impartiality and objectivity.
4. **Significant interest in science and technology-based policy in the legislature.** Legislatures that navigate more science- and technology-focused policy may provide a better opportunity for scientific advising and may be likely to benefit from – and be open to – the expert scientific and technical input science and technology policy fellows would provide.
5. **Sufficient workload and continuity.** State legislatures that can best provide a rich experience are those with enough material to engage the fellow and the year-to-year continuity required to maintain the staff's familiarity with the program.
6. **Appropriate staffing structure.** Individual state legislatures will need a fellowship that fits within the existing legislative staffing framework, which varies widely between states.

² Other initial funders include the TOSA Family Foundation, Heising-Simons Foundation, S.D. Bechtel Jr. Foundation, Kingfisher Foundation, and Gen-Probe Corporation.

- 7. Integration with existing fellowships.** In states that have existing legislative fellowships, it is necessary to foster an environment of cooperation, as opposed to competition.

Elements of an effective program

CCST recommends building a fellowship that has the following features:

- 1. Advisory body.** The group should consist of thought leaders who serve as advisors, ambassadors, and champions of the program and who advise on overall program development, implementation, evaluation and sustainability.
- 2. Structured selection process.** The process includes an outreach and advertising strategy, an application procedure, an application evaluation, and an interview process.
- 3. Training.** Fellows become familiar with the history, procedures, and unwritten rules that are necessary to be successful in the Legislature.
- 4. Placement process.** Interviews between each fellow and each office available to host a fellow has been shown to facilitate the matchmaking effort that program administrators must undertake.
- 5. Professional development.** Career training enriches the experience for fellows and prepares them for their post-fellowship job placement.
- 6. Assignment of an official mentor.** Mentors are usually supervisors or chiefs-of-staff from host offices and provide important guidance and oversight for the fellow.
- 7. Recognition for fellows, mentors, and champions.** Publically acknowledging those associated with the fellowship imbues an emotional and professional investment for the participants and the larger legislative community.
- 8. Impact measurement.** Qualitative and quantitative (to the extent they can be devised) measures are necessary to demonstrate the contribution that science fellows make in the policy arena, which is also important for some funders.
- 9. Fellowship alumni network.** Networks build and maintain relationships among past program participants, current fellows, policymakers, and other policy fellowship programs.
- 10. Appropriate fellowship duration.** Individual states will need to assess their goals within the framework of available funding and legislative structure in order to determine an appropriate fellowship length.

Conclusion: Considerations for New Science and Technology Policy Fellowship Programs outside of California

The CCST Science and Technology Policy Fellowship program in Sacramento, now in its seventh year, has proven to be a success. Other PhD-level state science advising fellowship programs may look significantly different, depending on the structure of the state legislature and its policy agenda. CCST has identified important factors and lessons learned to help inform other states that may be considering establishing a program.

Elements of a Successful Science and Technology Policy Fellowship Program for State Legislatures

Purpose

The Gordon and Betty Moore Foundation requested that the California Council on Science and Technology (CCST) produce a report listing key criteria and elements required for initiating and maintaining an effective state-level science advising fellowship program in the California capitol. This document is an overarching summary of essential factors upon which to reflect when assessing states where such a program – or similar variant – might be established. It identifies intrinsic programmatic elements that, in California’s case, were crucial to the Fellowship’s success. CCST bases these recommendations on its own experience with its California-based Science and Technology Policy Fellowship, with input from the National Conference of State Legislatures (NCSL) and Dr. Michael Rodemeyer, a retired engineering professor from the University of Virginia with over 30 years of experience in the science, technology, and policy world.

Introduction

The American Association for the Advancement of Science (AAAS) expressed the need for increased communication between scientific experts and policymakers. *“The science and engineering challenges that society faces today – locally, nationally and internationally – are far more complex than were those of 40 to 50 years ago. The problems now are more difficult to define and the solutions more difficult to identify and implement. The best available scientific, technical and economic information is required to establish priorities, make decisions, and develop best policies and practices. Yet, scientists often lack the skills and opportunity to apply their science successfully to support policy or to communicate effectively with the public and other non-academic audiences. Consequently, society’s needs for the most credible and objective scientific information are not being met.”*

State legislators and policymakers across the country tackle multifaceted challenges involving science and technology, such as water resources, privacy, energy resources, healthcare, communications systems, environment and food safety. Because these policies have widespread and long-term impacts, it is increasingly valuable and important for lawmakers to have access to trusted, impartial experts in science and technology who can advise decision-makers and help produce policies that are based on reliable data and sound analysis.

Among the many science-related policy issues that state legislatures are currently grappling with, significant debate has recently occurred over questions relating to:

- Hydraulic fracturing as a method of well stimulation for oil and natural gas
- Mandatory vaccinations against childhood diseases
- Stem cell research
- Global climate change
- Genetically modified organisms
- Nuclear power as a sustainable energy source
- Offshore drilling for oil

This short list of topics demonstrates the ongoing need for scientific and technological expertise to inform the debates and advise the decision-makers. A vision for the future is a network of state-based science advising programs across the country that provide legislators and other policymakers with pertinent data and prudent analyses on current science and technology-relevant policy issues with the goal of increasing the robustness of evidence-based decision-making nationwide.

Approaches to Science Advising

Science and technology inform state policy in various ways. For example, scientists and engineers can provide direct testimony at legislative, informational and oversight hearings. However, professional scientists and engineers that have not received specific public policy training often testify in too great detail, are often called upon for their expertise after bills have already been written, and are not consulted in the amendment process. Another way in which science and technology inform policy is through journalism, specifically investigative journalism or journalism that focuses on science and technology related issues. Journalists may have influence over public opinion, but decision-makers cannot necessarily count on them as trusted, impartial advisors. Research entities within state legislatures that are specifically charged with analysis of science policies serve as key resources, but few of them employ PhD scientists and engineers, so their ability to digest abstruse data is limited.

The objective of CCST's approach to science advising was to foster a more direct connection between scientific researchers and the Legislature. In pursuit of this goal, it launched a fellowship that places PhD-level and equivalent scientists and engineers alongside staff of state legislators. A number of potential models for state science policy fellowships exist nationally, such as the American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellowship, the National Academies' Christine Mirzayan Science & Technology Policy Graduate Fellowship, and the National Academies' Jefferson Science Fellowship. In many of these models, scientists are placed within US Congress and executive branch offices and contribute at the federal level. Fewer fellowship programs operate at the state legislative level. In addition to the CCST Science and Technology Policy Fellowship in the California Legislature, the Oregon Sea Grant Legislative Fellowship places one marine scientist in the Oregon Legislature, who

focuses primarily on marine and coastal issues that are important to state legislators. In Massachusetts, the Boston Society of Civil Engineers supports a Legislative Fellow each year at the Statehouse in the Joint Committee on Transportation.

A Partnership for Science Advising—How California is Tackling the Challenge

Created in 1988 pursuant to a legislative resolution, CCST ensures that independent, objective, and nonpartisan science and technology counsel is made available to state government officials by distinguished scholar experts and research institutions. The Science Program at the Gordon and Betty Moore Foundation creates new – often groundbreaking – scientific partnerships and invests in projects that reduce barriers to progress. It believes in enhancing society’s understanding of the inherent value of science. In 2007, CCST and the Moore Foundation began discussions on how to take advantage of their aligned interests in enhancing evidence-based science and technology related legislation in the California capitol.

The idea of a science advising program comprised of PhD-level scientists and engineers at the state level is not new. The National Science Foundation funded the placement of scientists in state legislators in the 1980s. As funding declined over the years, however, the program was phased out. The idea for the California program evolved from discussions among CCST members who were familiar with fellowship programs at AAAS and the National Academies. A concept for a state program was developed and funding sources were explored.

With a Moore Foundation grant, and with additional corporate and private foundation support, the CCST Science and Technology Policy Fellowship program was launched in late 2008 with the first class of Fellows placed in the Legislature in 2009. The primary goal of the program was to enable the California State Legislature to become better informed on science and technology matters through increased access to scientific and technical knowledge and independent policy advice. The belief was that state policy that has a science and technology component can be more deeply informed by having fellows who understand and can effectively translate the science. CCST also intended to create a cadre of scientists who would stay in the policy arena after their Fellowship so that scientific expertise would continue to percolate throughout the state government, creating a lasting contribution to science policy.

While securing initial funds, CCST began discussions with legislative leadership as to how the Fellowship could be implemented to provide the most value to the policymaking operations of each house. It was determined at the outset that California’s political ethics law would require the acceptance of policy expertise at no cost to the state to be reported by individual legislators as a gift. This did not comport with the original intention of the Fellowship program, so a bill was drafted to exempt the CCST Fellowship from that section of the law. The bill was introduced during the 2009

legislative session, passed unanimously by all committees and each house, and was signed into law by the Governor³.

Additionally, a memorandum of understanding (MOU) was signed between the Legislature's Joint Rules Committee and CCST. This MOU spelled out all the conditions by which the Legislature would allow Fellows to work in the Capitol. It also very clearly delineated the ethics rules by which Fellows were to function in their jobs.

The first class of ten Fellows was selected in the summer of 2009 and began their Fellowship in November of that year. Each year since, approximately ten new Fellows have been selected and placed in the two houses of the Legislature – typically five in the Assembly and five in the Senate. Fellows are assigned to work in both policy committees and individual legislators' offices.

Over the six years of the program, Fellows have worked on a wide spectrum of policy issues, some with complex science elements, and some with broader subject matter in social policy and government regulations. They have drafted, analyzed and provided staff support for hundreds of bills on topics that varied from health, energy, the environment, and natural resources to prisons, professional licensing, human services and transportation. Additionally, Fellows have drafted amendments that better reflect current and accurate scientific information. They contributed fresh, data-driven insights, independent and impartial analysis, specialized knowledge and problem-solving skills. Their science-based approach has helped the Legislature consider expanded scientific and technical options. The Fellows have become highly valued by policymakers for their expertise that informs many of California's groundbreaking policies, which have contributed to the state's economic growth and world standing.

In California, the CCST Fellows program continues to expand the number of science and technology experts who reside in the California Legislature. Each year, with many of the Science and Technology Policy Fellows securing permanent positions within the Legislature, a new culture of science expertise is making an imprint on many legislative actions, with the goal of improving the state's economy and quality of life.

Qualitative Successes

Over the course of the Fellowship's first six years, numerous expressions of gratitude and praise have been received from legislators:

“This is a terrific program. It's very significant because public policy now often involves technology and science, and these people have done a great public

³ The Moore Foundation has prepared memorandums that discuss other issues including 1) the legal basis for funding the CCST Fellows program and associated ethical issues, and 2) considerations for creating and funding this type of program for jurisdictions outside of the California State Government.

service. I hope [the Fellows] will find a way to continue to mix their interest, passion in science, technology, and public policy. You can see that those who participate in this program really get a diversity of experience. But it's not only a benefit to them, it's a benefit to the Senate and the state."

—Former Senate President pro Tem Darrell Steinberg

"All of these science Fellows have brought a wide body of knowledge and experience to the Assembly, and they have shared those insights with us on issues of critical importance to the well-being of our state. To the Fellows let me just say it's been a privilege to host you, and I hope you got as much benefit from this experience as we did."

—Speaker of the Assembly Toni Atkins

"CCST Fellows bridge the gap between science and politics and are helping to increase the opportunity for policy to be informed by science in California."

—Former Senator and Assembly Minority Leader Sam Blakeslee

"Legislation should be based on facts and data. CCST Fellows bring science and truth to legislation."

—Assemblymember Bill Quirk

The success of the program can also be noted by comments the Fellows themselves have made:

Impact on the State

"I analyzed a controversial piece of legislation and worked with my chairperson to create a solution that worked for all parties."

—Mandy Arens, Assembly Water, Parks, and Wildlife Committee

"It was refreshing to successfully apply my analytical, research, and communication skills in an entirely new setting. My criminal justice research made a difference and helped keep a state department accountable."

—Malaika Singleton, Senate Office of Research

"I analyzed bills on current issues impacting all Californians – hazardous rail shipments, fracking, and pharmaceutical take-back programs."

—Karen Morrison, Senate Environmental Quality Committee

Impact on the Fellow

"If you're at all interested in policy, this is the absolute best way to learn the process. Even if you decide not to stay in Sacramento, you will learn a ton of useful skills for your next job choice. The CCST network is incredibly supportive

and make the career transition from lab to policy so much better than I thought it would be.”

–Sarah Brady, Office of Assemblymember Susan Bonilla

“CCST’s Science Policy Fellowship has given me the opportunity to apply my analytical and problem-solving skills in an entirely different arena, and make a positive impact on society in a comparably short amount of time. I discovered that policy work is both intellectually stimulating and professionally fulfilling, and I plan to continue working in the public or nonprofit sector. “

-Shannon Muir, Senate Health Committee

Quantitative Successes

Quantifying the impact of the contributions Science and Technology Policy Fellows make to the legislative process has proven to be a challenge. Program administrators found that it is difficult to quantify whether and how much the program increased the degree to which the legislature was informed on science and technology matters. Any such attempt would be highly subjective, because most pieces of legislation have supporters and detractors. Moreover, identifying the independent effect on society of any given piece of legislation is challenging. CCST decided to take a more practical approach by focusing on the Fellows’ “inputs” to the science and technology legislative process (i.e. the amount of time they devote to various activities, as reported in their weekly surveys, the number of bills on which they worked, and the types of projects to which they are assigned). Additionally, the perceived value of the program can be measured such as by quantifying each year the number of offices that request fellows, as well as the number of offices that repeatedly request fellows.

The success of the program can also be gauged by examining the career paths Fellows choose after their fellowships ended, which is an important measure if the Fellowship is to fulfill its objective of making lasting contributions to science policy. Of the 59 Fellows who completed the program over the last six years, 24 (40%) continue to work in the California Legislature (often in the office in which they were placed) or in state government agencies. Three are now working in federal agencies or the US Congress, one has become the director of public health for a major city, six are in policy positions with non-government organizations, seven have taken research and management positions in private industry, two are working for science professional societies, and 11 have returned to academia. Overall, 70% of graduates of the program remained in policy-related work.

Lessons Learned

CCST’s Science and Technology Policy program has been such a resounding success that the Moore Foundation and CCST are seeking to share the lessons learned with others who may consider developing fellowship programs in other states. Judicious

identification of states that are well suited to house fellowship programs similar to CCST's is imperative for additional success. This process, in addition to a new fellowship program's eventual launch, would require a large investment of time and relationship-building, and should therefore be planned diligently. As the CCST Fellowship begins recruiting for its eighth year, it continues to evaluate its program in order to provide stakeholders with insights gleaned from accumulated experience and counsel from other knowledgeable sources. Hopefully these recommendations will inspire scientific and policy communities across the nation, and potentially elsewhere, to engage with one another, and will help inform and hasten the establishment of new science policy fellowship programs.

Criteria for an Effective Program at the State Level

The CCST Science and Technology Policy Fellowship has placed approximately 10 Science Policy Fellows in the California State Legislature each year since 2009. In the years since it launched, the Fellowship program has grown in impact, popularity and reputation. Translating this success to other states requires careful assessment of the science and technology policy landscape in other capitols. A legislative environment ripe for the establishment of a fruitful fellowship program is one in which there is an acknowledged need for greater in-house scientific expertise in policy analysis and discussions. However, this quality alone is not sufficient to initiate and maintain a strong fellowship program that places highly trained scientists and engineers in a state legislature.

Based on its experience with establishing and managing a respected science and technology policy fellowship program in the California State Legislature, CCST has identified a number of criteria important for launching similar programs in other states. CCST recommends that candidate states have, or have the potential to develop, the following criteria, in equal priority:

1. **Champions for a fellowship program.** Dedicated champions are needed both within and outside the legislature who can galvanize support for a program. The more connected and influential the champions are, the better. Examples include current and former elected or appointed government officials, high-level legislative staffers, community leaders, prominent scientists, and notable citizens.
2. **To manage the program, a host organizations dedicated to improving the engagement between scientists and policymakers.** The importance of an appropriate host organization cannot be overstated, as the success of a fellowship depends heavily on factors that the organization will manage. From recruiting, selecting and training the highest quality fellows, to establishing and maintaining excellent relationships with legislative leadership, the organization's role in building and maintaining the fellowship's reputation is central. Ideally, the host organization should be unbiased, nonpartisan, and credible with an excellent reputation, and funded by sources that do not create or give the impression of political or economic conflicts of interest.
3. **Funding sources.** Sustained funding is essential to grow the program's visibility and reputation. In CCST's experience, family foundations have proven excellent funding resources for the establishment of a program. However, it can be difficult to secure sustained funding. Other funding sources might include individual donors; state

public funds; science, technology and policy boundary⁴ organizations; or consortia of research and professional organizations. As noted earlier, it is imperative for the program's integrity that funding be secured from impartial or balanced sources. Maintaining the independent, nonpartisan appeal is achieved by having many funders, and a clear separation between donors and fellowship activities. Public funding should be sought, but may be difficult to secure given the nature of competing fiscal priorities.

4. **Significant interest in science and technology-based policy.** Legislatures that generate more science- and technology-focused policy may provide a better opportunity for scientific advising and are most likely to be open to the expert scientific and technical input. An appetite for science and technology policy advising might be demonstrated through the introduction of a relatively high number of science- or technology-related bills. The existence of science- and technology-related committees within the legislature can be taken as evidence of an openness to and opportunity for scientific advising, as can the existence of support offices dedicated to providing science/technology policy research and analysis. It should be noted, however, that legislatures with few or no committees or offices dedicated to analyzing policy with science or technology components may in some cases more strongly demonstrate a need for expert advice, and not necessarily belie a resistance to such advice.
5. **Sufficient workload and continuity.** A core attraction of the fellowship is the hands-on policy experience gained under the ongoing mentorship of legislative staff. State legislatures that can best provide a rich experience are those with enough material to keep the fellow engaged throughout the year and the year-to-year continuity required to maintain the staff's familiarity with the program. A full-time legislature or a part-time legislature with significant interim staff activity is most likely to provide ample opportunity for fellow participation and the continuity to allow the program's reputation to grow. In legislatures that do not meet year-round or even every year, permanent legislative support organizations may be excellent places to house fellows, particularly if the organization specifically offers science- and technology-related research and policy analysis.
6. **Appropriate staffing structure.** There are some important distinctions to note when considering how to structure fellowship programs outside of California. CCST's Fellowship model places Fellows in both personal and committee offices in both the

⁴ Boundary Organizations are formal structures that create connections across traditional boundaries, such as the boundary between science and non-science (or science and policy). A boundary organization "serves as a bridge between the two sides and ideally has the following characteristics: non-partisan, dual accountability, safe harbor, use-driven science, and co-production of science." National Research Council, Roundtable on Science and Technology for Sustainability 2006. Linking Knowledge with Action for Sustainable Development: The Role of Program Management – Summary of a Workshop. William C. Clark and Laura Holliday, rapporteurs. Washington: National Academic Press.

Assembly and the Senate. However, dissimilar staffing structures in other states may necessitate a different model. Nearly every state has a central, non-partisan research unit that serves either one or both chambers of the legislature. In many cases, however, the research carried out by these offices is limited to legislative histories, or tallies of bills introduced (irrespective of content) by each house. Fewer seem to engage in strong policy research and analysis activities, and not all of these have scientific expertise. The roles of some offices are limited to bill drafting, whereas others not only draft legislation but also staff committees, perform in-depth policy research, convene experts for task force work, and even organize and conduct primary studies for the legislatures they serve. Some legislative support offices do in-depth policy analysis while others are dedicated to fiscal analyses. The National Conference on State Legislatures (NCSL) has compiled a list of legislative service offices for the states, but without further research into the activities of each office it is difficult to assess which are best suited for housing science and technology policy fellows. Focusing on placement directly with decision-makers is the goal, but it may prove useful in some cases to place fellows in central, non-partisan research shops to start the process, and eventually move fellows into personal offices when that opportunity is available. This design might allow the program to build its reputation while making important connections that would allow for a smooth transition for additional fellowship placements. As staff from the NCSL noted, these legislative service offices “are *part of* the legislature, not organizations *apart from* the legislature.”

7. **Integration with existing fellowships.** Since 1973, California has had a “Capital Fellows Program” for recent college graduates with bachelor’s degrees (and occasionally higher degrees), and every year it places approximately 36 Fellows within legislative offices. Several of California’s elected officials and high-ranking legislative staff members are former Capital Fellows. The Capital Fellowship’s long history and expansive, influential alumni network provide the program with inherent political power. Launching the CCST Science and Technology Policy Fellowship program in the same “space” as the existing Capital Fellows Program required extensive planning, framing, communication, and flexibility. Both Science Policy fellows and Capital Fellows serve alongside staff, but Capital Fellows do not have a particular focus on science and technology. All Fellows are expected to work on any issue or project asked of them regardless of whether it has a science and technology component. Other states considering a Science and Technology Policy Fellowship will need to be cognizant of existing fellowships, internships, and other programs that interact with the legislature in a similar fashion, and actively foster an environment of cooperation and collaboration instead of competition.

These criteria are in no way exhaustive, and individual states will need to be researched thoroughly to address any additional circumstances that could help or inhibit the foundation of a science and technology policy fellowship program.

Elements of an Effective Program

A fellowship in a state that has high potential for a successful program based on extrinsic criteria is not guaranteed to flourish. Intrinsic programmatic elements must also exist in order to build and maintain an effective fellowship. It has been CCST's experience that the essential elements of a successful science-advising program should include the following:

1. **Advisory body.** An advisory body is an excellent forum to engage program champions and should consist of thought leaders who serve as advisors, ambassadors, and supporters of the program such as individuals with science technology policy experience at the national or state level, former decision-makers, philanthropists, or those who have experience developing or managing similar programs. These individuals can advise on overall program development, implementation, and evaluation as well as sustainability.
2. **Selection process.** The selection process should include an advertising and outreach strategy to market the program to target audiences, a well-defined and consistent application procedure, and an application evaluation and candidate interview process that identifies skill sets necessary for the environment in which the fellows will be placed. The participation of current and former Fellows and legislative staffers in the interview process has proven to be invaluable in helping identify candidates who would be a good fit for the program as well as helping candidates better understand the program prior to their decision to accept the Fellowship.
3. **Training.** During the first month of the Fellowship year, CCST Fellows participate in intensive training that assumes no knowledge of the state's history, the legislative process, or the culture within the capitol. Training is led by CCST staff, academic professors, former Fellows, and policy professionals. Outside speakers enhance the training experience, but CCST has learned that it is equally important for trainees to develop a sense of teamwork and trust that can only be achieved with internal activities and interactions. Some training modules are formal and lecture-based, whereas others consist of less-structured panel discussions. The training curriculum includes formulation of bill ideas, bill analysis, the importance of the legislative calendar and deadlines, navigation of the political process, and the unwritten rules that staffers must know to be successful in the legislative environment.
4. **Placement process.** The placement process is critical to the success of each fellow, as well as to the overall reputation of the program. Interviews between each fellow and each potential host office has greatly facilitated the matchmaking effort that program administrators must undertake. Fellows and offices rank each other, and every effort is made to accommodate the needs of the fellows and the offices while taking into account political realities and extenuating factors.

5. **Professional development.** CCST Fellows meet for weekly seminars, some with high-level government officials as guests, some with informational topics and others focused solely on confidential discussions with colleagues. The seminars function as networking opportunities and also expose the Fellows to a wide variety of career possibilities. CCST also coordinates an offsite, multi-day Fellowship retreat focused on career planning, job hunting, and identifying professional strengths as well as areas in which Fellows have opportunities for growth.
6. **Assignment of an official mentor.** Each CCST Fellow is assigned an official mentor who is usually the supervisor or chief-of-staff from the host office. The mentor's primary responsibility is to counsel the Fellow about procedures, policies, politics, and office culture. In addition to the designated mentor, CCST staff members are available for advice, information, and counseling.
7. **Recognition for fellows, mentors, and champions.** CCST hosts several events throughout the year to introduce Fellows to legislative staff, Fellowship alumni, CCST senior members and leadership, and funders. Interactions between Fellows and champions help the funders see impact achieved, and make the Fellowship program personal and less abstract. At the end of the Fellowship year, the Fellows are recognized on the floor of their respective legislative chambers and given an official, personalized state resolution thanking them for their public service. The last official event of the Fellowship is a farewell dinner at which their work is recognized by their host offices, and there is an opportunity to acknowledge each of the mentors who coached their Fellow throughout the year.
8. **Impact measurement.** Determining the fellows' contribution is an important program element for fellowship administrators, funders, and potential funders. As noted earlier, it is difficult to devise numeric data that fully describes the difference that the fellowship makes in the legislative process and in the lives and careers of the fellows themselves. A good set of quantitative and qualitative measures, especially anecdotal information and comments from legislators and fellows, is necessary to tell the story of the impact that science fellows can make in the policymaking world.
9. **Fellowship alumni network.** A thriving alumni network provides a venue for networking, professional development, social communication, collaboration, and outreach, and has been found to be integral to the success of the program. An alumni network can build and maintain relationships among past program participants, current fellows, and policymakers. The group harnesses the power of the alumni network to enhance and sustain the contributions of current and former fellows in the public policy arena and society at large. It also provides an opportunity to connect with the larger alumni networks of other science and technology policy fellowship programs, particularly those run by the American Association for the Advancement of Science (AAAS) and the National Academies in Washington, DC.

10. **Appropriate fellowship duration.** CCST's Science and Technology Policy Fellowships currently last for one year. There have been discussions about extending the Fellowship to two years so that it encompasses an entire legislative session, or admitting 10 new Fellows every year while still retaining all or some of the Fellows from the previous year, which would incur additional expense. An initial analysis suggests any savings between funding a first year Fellow and second year Fellow would be negligible. Other states may find that there is only enough interest to support a cohort every other year, or may have other reasons for adjusting the duration of the fellowship. CCST will continue to explore extending the length of the Fellowship, though funding is the primary constraint at this time.

Depending on the state, additional elements may be needed for a fellowship to thrive. It will be up to the program designers and administrators to determine what those elements will be.

Conclusion

With the help of the Moore Foundation and many others, CCST has created a Fellowship in California that increases policy-makers access to scientific information while also raising awareness of scientific issues and training scientists and engineers to be effective public servants. These successes can be built upon if other states express interest in launching a similar program.

There are a number of criteria and programmatic elements that are necessary for a state legislature science policy fellowship to succeed in integrating scientific thinking into the legislative process. Examining various state legislative staff structures, it is clear that each state will need to develop a program that fits their unique needs and circumstances.

For a state considering a science and technology policy fellowship program, additional research should be done with respect to identifying champions and funding sources, and CCST is happy to serve as a resource. An effort to do this will require a significant amount of personal contact and nuanced conversation. In the end, other state-level science policy fellowship programs may look significantly different from the one in California, and they can also be very successful in infusing more science into policy-making and educating scientists on the role of science in policy.