National Aeronautics and Space Administration
5/7/19

- Meeting with the administrator of NASA, Jim Bridenstine, a political appointee of Donald Trump
    - Former Navy pilot who went to Rice. He flew off a carrier in the Persian Gulf in 2002, participated in operations Enduring & Iraqi Freedom in 2003. He flew in an E2 Hawkeye and F18 Hornet
    - Also joined by Tom Cremins, a career deputy at NASA
    - Bridenstine worked for Wiley Labs until 2007, then started a non-profit air and space museum in Tulsa, then became a congressman for 5 years
- Cremins giving an overview of NASA, talking about how of the 18k employees the number in the life sciences is increasing
    - NASA has similar programs to the AAAS fellows, interested people from the trip can email Tom for more details
    - “Great place to be a public servant”; Tom says there are opportunities to work on big issues in individual careers in a larger community with vibrant passions
- Opening up to Questions and Answers
- Q: What new areas of science is NASA expanding into?
    - A: ISS Astronauts lose 1-3% of bone mass, immune system becomes degraded, appetite changes, thrombosis etc. NASA wants to know if going to the moon reverses these changes, so that they know what happens when people are sent to Mars. New focuses on life science
        - Also work on compounding pharmaceuticals in ways that cannot be done within a gravity well, 3D printing organs in space

Centers for Disease Control and Prevention (CDC)
5/8/19

We visited the Centers for Disease Control and Prevention (CDC) Washington Office. The CDC Washington Office is one of several CDC offices (others include the headquarters in Atlanta and BSL-4 labs in places like Montana); the Washington office specializes in communication with and advising the federal government, serving as an intermediate between Atlanta and Congress.

- CDC Washington ensures that Congress is informed of developments related to disease control ahead of time and prepares it for potential threats. A major component of the CDC’s work is to translate the work of CDC scientists for Capitol Hill.
- It may request funding from Congress to take action in specific areas.

- It plays an important role in directing Congress to take adequate measures, since often members of Congress will not necessarily know the appropriate response to a public health situation. In the case of an emergency, the CDC's Emergency Operations Center often plays an important role in response.
- It will provide answers if a Congressperson reaches out to CDC to ask about a measles outbreak affecting their constituency.

At CDC Washington, we met with Amanda Crouse (National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)), Eric Wortman (National Center for Environmental Health (NCEH)), Nancy Tourk (National Center for Immunization and Respiratory Diseases (NCIRD)) and Barbara Rogers (Center for Preparedness and Response).

- Amanda Crouse, as part of NCEZID, has worked on antimicrobial resistance and high-consequence pathogens.
- Eric Wortman, as part of NCEH, works at the Agency for Toxic Substances and Disease Registry (ATSDR), among other areas covered by NCEH. He previously worked on Capitol Hill for 12 years.
- Nancy Tourk, as part of NCIRD, has worked on vaccine-preventable diseases. She previously worked at CDC's National Institute for Occupational Safety and Health (NIOSH), which produces much of the research behind regulations made by the Occupational Safety and Health Administration (OSHA), in addition to issuing some of its own regulations. NIOSH covers issues like personal protective equipment and firefighter cancer.
- Barbara Rogers, as part of the Center for Preparedness and Response, covers issues like responding to demand outpacing state capacity in outbreaks, funding state health departments, preparedness exercises and lab science and safety. She previously spent 4 years on the House and Senate environmental law committees, as well as working in the Justice Department conducting environmental law enforcement.

We briefly discussed the skills relevant to working at the CDC. None of the panelists had a science background. They discussed the importance of being able to convey relevant and complex scientific information in simple terms without appearing condescending. Another skill is to communicate well under pressure at Congressional hearings; such hearings only occur a few times a year but require a lot of preparation.

Several participants on the trip were interested to know how much the CDC was confined to reactions and emergency responses, and whether it was possible to develop long term strategic plans to improve public health in the US. In addition to emergency response, the CDC runs a number of disease surveillance programs and builds international response capacity.

As for emergency response, Nancy Tourk discussed that the recent measles outbreak is an important priority at the CDC. In order to ensure that children in affected communities are vaccinated, they collaborate closely with those communities, particularly providers, and disseminate information that the vaccine is safe. The CDC tries to avoid stigmatization of

anti-vaxxers, since this is a diverse group and encourage dialogue. In their communication efforts the CDC will employ a variety of means, including Twitter, and work closely with providers, who are also at the forefront of identifying new cases.

National Academy of Sciences (NAS)
5/8/2019

On Wednesday May 8th, 2019 the GSAS Science Policy Group had a one hour meeting with Dr. Anne-Marie Mazza, Sr. Director of the Science, Technology, and Law (STL) program in the National Academies. Dr. Mazza led the discussion by introducing the history of The National Academies, and then by discussing two main cases that her committee has recently worked on: Forensic Science and Human Germline Gene Editing. Members of the GSAS Science Policy Group asked questions at various points throughout the meeting.

What is NAS?
The National Academies of Sciences (NAS) was established in 1863 by Abraham Lincoln during
the height of the Civil War. It was to serve as a source of unbiased advice to the nation on areas of the arts and sciences. Since then, it has largely remained in this role as a private non-profit organization committed to upholding scientific virtues, which has extended to engineering and medicine.

The organization takes on several roles that act to help organize the nation's scientific activity. First, they recognize excellence in the scientific community by admitting members to join the academies. Members may then be asked to serve the nation through the National Research Council (NRC) which convenes to conduct studies on the state of scientific research in various fields. Further, the Academies act to provide advice to various members of the government and this is largely through ad-hoc committees. The NAS has 7 divisions, with their own committees, who work to maintain the health of the research enterprise and identify "pipeline issues" within various fields.

Case 1: Forensic Science
The 2009 forensic science case was a congressionally mandated study to examine the state of forensic science in the US. Like other NAS studies, it proceeded over the course of about two years and was necessary to take a broad look at the state of the field. The committee who worked on this case comprised of judges, field experts on forensic science, and expert scientists from outside fields. Dr. Mazza described the writing process of this study, which begins with staff writers who draft an outline, and then is passed on to the committee who own the report and rewrite any points as necessary. Generally, NAS reports try to reach a general consensus, but dissenting opinions are included in footnotes or appendix sections. While the NAS cannot

lobby, it seeks to improve the quality of legislation and science policy through its findings. In this
effort, the NAS does not share results from their findings until a report is given to the convening agency, a day before public release. In the case of the 2009 forensic science report, it was discovered that all veracity of all forensic evidence, with the exception of nuclear DNA, is poorly constrained and should not be considered sufficient evidence for conviction. She mentioned that
John Oliver recounts the overall results accurately, on Last Week Tonight, in the episode called "Forensic Science."

Q and A:

Q: Could you share your personal history and how you came to be the director of STL?

Director Mazza discussed how she began in litigation, working as a consultant on industrial disasters after studying history. Then she decided to pivot from consulting and worked for OTSU, the Office of Science and Technology Policy, before applying to NAS. She then decided to go back to school and got a Ph.D from Georgetown University in Science and Technology Policy. Dr. Mazza has been at the Academies for 24 years and said that her current job did not exist when she started there. She went on to explain how her winding career path was evidence
that one's first job is not the end of one's story. She also distinguished a career in this type of science policy from being in a limelight where one actively forms policy.

Q: How do NAS committees consider the audience for their reports and activities?
Director Mazza answered that considerations of the audience, various stakeholders, are always at the forefront of considerations, and that the NAS is active in sharing science with the wider public. She highlighted that the NAS hosts a Family Day every year which brings in thousands of folks in the greater DC area. She also mentioned that the NAS consults with Hollywood on how science is being portrayed in entertainment/media and cited that roughly 200 science consultations are performed per year for movies and television programs.

Germline Genome Editing/ The Advent of CRISPR/Cas9
The remainder of the session was devoted to Director Mazza's recounting efforts the NAS has been apart of to get the conversation going on germline genome editing. In 2015, after the research was published on germline genome editing, Jennifer Doudna, met with the NAS to host an international summit in Washington, DC to discuss the promise and perils of this new technology. The purpose of the summit was to discuss the current state of CRISPR research, as well as regulations that exist and may be needed in the future. At the end of the summit, a statement was released with the following conclusions:

1. More basic, preclinical research on germline gene editing should occur.
2. No embryo that has had its genome edited should be implanted, but somatic gene therapy is okay.

3. The ethics of gene editing need to be considered further and we need public engagement.
4. The group “envisions a time” when germline genome editing may be used in dire circumstances.

Dr. Mazza then discussed the 2nd international summit on CRISPR technology, held in November 2018, in Hong Kong. The NAS co-sponsored this meeting, along with the Hong Kong
Academy of Sciences. Upon arriving in Hong Kong for the summit, Dr. Mazza learned that He Jiankui, a Chinese scientist, was about to announce that he had edited the germline of twin babies, who had just been born. The ensuing media circus and political pushback is an illustrative lesson that ethics must be embedded into the practice of science, and not something merely taught in a class.

Lastly, Director Mazza shared details on the Mirzayan Program, a 12-week Fellowship Program at the NAS, for early career scientists to learn about science and technology policy and what a career in science policy may look like.

Science and Technology Policy Institute
5/8/19

At the Science and Technology Policy Institute (STPI), the GSAS Science Policy Group met with three members of the research staff: Dr. Brian Zuckerman, Dr. Sharon Williams, and Dr. Ian Simon. The researchers began our hour-long meeting with a presentation on the organization, its core work, and its portfolio. STPI is a Federally Funded Research Development Center (FFRDC), meaning that its funding is from the federal government. In order to resist political interference, these funds are housed in the National Science Foundation. It is the only FFRDC serving the executive office of the President through its support for the Office of Science Technology and Policy (OSTP). STPI is managed by the Institute for Defense Analyses. The organization provides policy continuity for OSTP activities, which are often subject to high turnover due to political transitions. Because it is serving the White House, STPI often works with sensitive information. STPI is composed of 45 staff, including 5 former fellows from the American Association for the Advancement of Science. More than half of the staff has a professional degree, PhD or similar.

STPI provides advice across three domains: policy assessment, strategic planning, and technology evaluation. These domains extend to the areas of energy and the environment, disaster preparedness, STEM education, aeronautics, biosecurity, biodefense, health regulation, grants management, and improving expenditure efficiency. STPI addresses both long term and immediate concerns through multi year and quick response analyses, highlighting the range of

time scales in which projects can take to complete. Agencies requesting support include NSF, NASA, NIH, DOE, DHS, and NIST, as well as congressional analyses. STPI helps these agencies and OSTP with tactical considerations.

STPI also introduced opportunities for early career scientists, including a policy fellows program for recent graduates from college who work as policy analysts for two to three years before returning to graduate studies. There are also paid summer internship opportunities for graduate students. The remainder of the hour was spent in a question and answer session. A paraphrased summary is provided below:

Q: Please describe the corporate culture of STPI
A: While other think tanks such as RAND is public facing, policy groups under the Institute for Defense Analyses, including STPI, are 'quiet' and do not show up in the public focus unless under the discretion of the sponsor. It is important to note that STPI focuses more on sponsor driven topics, which creates a bit of a different corporate culture.

Q: STPI has at wide policy portfolio but a small number of staffers who can cover these topics. How is this tension managed through staffing choices?
A: Dr. Simon responded, saying that STPI cannot have specialists in all topics, the goal is to bring in people who have strong technical backgrounds, but are intellectually nimble and able to work proficiently in many content areas. These are people who can learn quickly from the true experts in a field. When making hiring choices, STPI selects for people who have worked in multiple domains with demonstrated proficiency, and is a contrast to larger think tanks or consultancies where content experts are hired. In Addition, it is important for staff to be able to apply their analytical skills to different fields and be able to know how to navigate and learn about new topics. They should be resourceful and know how to talk to experts in the field, ask smart questions, pull out the relevant information, and be able to present it back in a cohesive way.

Q: How does a career at STPI compare to a track in academia?
A: Dr. Williams notes that there are benefits and costs to a career at STPI. The benefits include more pay, freedom from grading and teaching requirements, and the ability to gain exposure to myriad topics. The downside is less choice in the exact specialty or project that one can work on.

Q: How has STPI been evolving over time?
A: It hasn't much; the goal of STPI is to be a source of stability in a changing environment. While the research topics that STPI is called upon for are largely constant, the specific focus of a given administration, say in quantum computing or space capabilities, are likely to change in time.

Q: How do you get feedback in your work if you are not public facing?
A: Often feedback does not come back, but for other projects it is clear that STPI's work leads to real change. Dr. Williams cites the example of a project on hearing aids whose findings made it to the President's desk and influenced the legislative agenda. STPI researchers also often publish related work, and are encouraged to belong to professional organizations.

Q: How is STPI involved in STEM education?
A: STPI has long helped with national strategic planning for STEM, and is now seen as a leader for STEM policy amongst the think tanks in Washington.

Q: Could you describe a typical day for a policy researcher?
A: Dr. Simon answered with a quip that while other agencies and think tanks are in meetings, STPI employees are busy doing the actual research. He described his work day as varied, but on average consisting of equal parts meetings, writing, and active research.

Q: Is there professional development for researchers onboarded to STPI?
A: Projects at STPI tend to be too varied for professional development, and it is expected that fellows will dive in and learn on the job. There is an informal mentoring system in place which helps new employees learn the ropes initially.

Q: When working on projects, does STPI feel political pressure to reach a certain conclusion?
A: The job of an FFRDC is to answer the question that is asked, without any interpretation or political advocacy. While STPI findings are usually well-received, there inevitably is some frustration among researchers when conclusions are provided to an agency that contradict an agency's goal, and thus those conclusions are ignored despite their veracity.

Senator Sheldon Whitehouse's office (with Ryan Edwards)
5/9/19

On Thursday, May 9th 2019 we visited the office of **Senator Sheldon Whitehouse** and met with his AAAS Science and Technology policy fellow Ryan Edwards. Sheldon Whitehouse is the United States Senator from Rhode Island, serving since 2007. Prior to coming to Washington he served as a U.S. Attorney and then the State Attorney General of Rhode Island. After a failed run for Governor in Rhode Island he ran and defeated incumbent Republican Senator Lincoln Chaffee in 2006. He is now in his third term as senator serving as a member of the Budget Committee; the Environment and Public Works Committee (EPW); the Judiciary Committee; and the Finance Committee. Even though Senator Whitehouse's education and

training has been in the legal sector he is an outspoken proponent of environmental protection and legislation to combat climate change. Through his dedication to this cause his office sought a AAAS fellow who could help support legislative work on climate change. Ryan Edwards, a recent PhD graduate in environmental engineering, was just such a fellow.

Ryan Edwards has a broad interest in energy and climate. During his Ph.D. studies at Princeton University, he immersed himself in the scientific, engineering, and policy aspects of the energy and climate challenge. His technical research focused on hydraulic fracturing ("fracking") and geological storage of carbon dioxide. Ryan worked on energy and climate policy as a fellow with the Woodrow Wilson School of Public and International Affairs, where he investigated pathways to accelerate deployment of carbon capture and storage. He also led a team working on Princeton University's carbon emissions reduction plans and co-authored a report on wind energy. Prior to moving to the United States from Australia, Ryan worked as an engineer in the mining and natural resource management industries.

We met with Ryan for just over an hour. Our conversation largely centered around his work as a AAAS fellow and advice he could share for how to get one of these prestigious positions. He explained that there are 30 congressional fellows and 150 executive fellows each year.

Advice for becoming a AAAS fellow and explanation of the process: There is a rigorous application process and successful candidates will demonstrate that working in policy is something they truly want to do. Applicants demonstrate this commitment in a number of ways as there is no requirement for prior policy experience before the start of the fellowship. Good strategies for demonstrating interest include practice communicating science to wider audiences beyond the science community and participating and leading science outreach events. Communication is key. As a fellow he is required to communicate all day long with various people within the government and constituents. So demonstrating a strong ability to communicate is essential. Ryan also worked on some policy issues while working towards his PhD. There was an intersection between his research and an important current policy issue so he ceased this opportunity to work on a policy paper with a collaborator where he supplied the technical expertise. During the interview process an example of a question they might ask is: "you are working for a senator that needs to know something in 5 minutes that you know nothing about, what do you do?" He conceded that the timescale is not usually this short but working for a senator you are strapped for time. It is important to gather good information quickly and efficiently and be able to communicate it just as efficiently. He didn't have a specific answer for us to the above question but he suggested the first step would be to ask around the office to find out if anyone else nearby had the information you needed. After being selected as a AAAS fellow you are actually in high demand. AAAS fellows are well regarded, in his year 100 congressional offices wanted a AAAS fellow and there were only 30 available. Ryan referred to this as a "meat market." The fellows meet with representatives from various offices in a large room, they have received information about the fellows and so will approach them. Then it is like a big chess game to figure out who wants to go with whom. Choosing the right office is important because some offices have more experience hosting fellows and so they are better prepared to fully utilize your talents. There is "institutional memory" within AAAS, mostly a stream of gossip from past fellows, that helps fellows determine what offices are good to

work for. But this is largely based on personal preferences. Currently of the 30 AAAS fellows 28 work in Democratic offices and only 2 in Republican offices. Partly this is because many fellows are liberal/democrats. He considered working in a Republican office because they had some overlapping interests, but you should not go into this thinking you are going to change minds and you will want to enjoy your experience. When you start working in an office you have a mentor to show you the ropes. In Whitehouse's office this mentor is a former AAAS fellow so he is particularly equipt to help and utilize Ryan to the fullest.

Roles and responsibilities as a AAAS fellow: The work a AAAS fellow performs will vary by the office. There are three main areas of work that Ryan performs: (1) He compiles the information that Senator Whitehouse needs. This often takes the form of writing memos such as about climate change and the new biodviersity report released by the UN. If there is any breaking news the senator should know about Ryan should be on it. He also supports the senator in gathering information to put in his speeches. (2) Ryan talks to stakeholders. These include the people of Rhode Island. (3) Working on legislation. He participates in coming up with ideas for legislation, sharing the ideas, and negotiating the issues. Something Ryan has come to appreciate in the legislative process is that you have to have people championing an idea and moving it forward. No champion, no progress. How this looks in practice is that a AAAS fellow, and all staff members, the majority of their work is to meet with people all day every day. The most challenging aspect of this work is the lack of time compared to the years you put into an idea when you are working in science research. But it is an exciting place to be. A lot of the legislative work happens at the staff level where information is gathered, negotiations happen, and legislation gets written. The staff turns over quite quickly because the pay is so bad. Many staffers go over to lobbying groups. When Congress turns over, which is also quite rapid, then lobbyists serve as a long term resource. Lobbyists know who does what throughout the government.

Ryan imparted the wisdom that you could not go into the AAAS fellowship wanting to solely work on one specific issue. The fellowship itself is about getting a political education, learning what the process is all about. It was implied, more so than outright stated, that a big benefit of the fellowship was meeting the right people, which could open doors for you to a career in policy.

Additional questions and conversations:

- How much freedom do you have? The amount of freedom you have depends on the office you are working in. Ryan has a fair bit of freedom. Most of the meetings he is in and the issues he is working on are driven by him.
- How much interaction do you have with other AAAS fellows? There is a lot of interaction between the current cohort of fellows. They are all going through a similar process so it is a helpful network to have. They do a lot of social gatherings like a volleyball league. Some fellows have been in D.C. awhile so they have a broader social network.
- Why is AAAS better than alternative options for getting your start in policy? If you do not start as a fellow such as this program most people start on the hill as an assistant, then work on mail, then legislative assistant. It is a slow process to move up in seniority. However, as a fellow you are already highly regarded and go straight to writing bills.

- Where do you see yourself after AAAS? As a foreigner Ryan cannot work in most parts of the government, unlike most of his fellow AAAS fellows. He wants to continue working at the intersection of science and policy. This could either be on the industry side or if he moves back to Australia he could work for the Australian government. Others fellows will stay on the hill, a number of fellows are on sabbatical from their full time jobs and will return to those careers (including a full professor from Hawaii). Overall there are just much broader opportunities after you do the AAAS fellowship and having a technical background with a PhD is a very powerful toolkit.
- What is the coolest this related to climate change that you have worked on? Helping write a speech for Senator Whitehouse and standing by his side while he delivered it on television to a national audience.
- Should climate scientists advocate? Yes, as individuals you should speak up, you must go beyond publishing papers. This can be possible by having a relationship to the people on the inside of the government. Meet with people, get their card and email them with your information. You can also work through NGOs that have connections and systems in place to connect scientists to policy makers.
- Has there been progress on climate change legislation? Ryan is optimistic. The green new deal has sparked a lot of conversation about climate change and there is growing pressure for them to do something. There is movement on a carbon tax and there was some success on tax credits for carbon capture. There are a couple of advanced nuclear bills to advance nuclear reactors. Senator Whitehouse is striving to get the conditions right for them to pass a full carbon bill.

Congressman Thomas Massie (R-KY)
5/9/19

On Thursday May 9th 2019 we visited Congressman Thomas Massie the representative from Kentucky's 4th Congressional District which spans Northern Kentucky and 280 miles of the Ohio River. In Kentucky he lives on a cattle ranch with his wife and four children. Representative Massie joined Congress in November 2012 and now serves on three committees: the House Committee on Transportation & Infrastructure, the Committee on Oversight and Government Reform, and the Committee on Science, Space, and Technology. Prior to joining Congress he served as Lewis County Judge-Executive. Representative Massie earned a Bachelor's degree in Electrical Engineering and a Master's Degree in Mechanical Engineering from Massachusetts Institute of Technology. His research while in school led to the invention of technology that enabled people to interact with computers using their sense of touch. He founded a company to leverage this technology, SensAble Technologies, Inc., and obtained 24 patents. This technology is being used in numerous industries to design automobiles, jewelry, shoes, dental prosthetics, and even reconstructive implants for wounded soldiers. Representative Massie stressed to us the value of having a scientific background to contribute to the government, not just from the perspective of the knowledge you bring to the

table but also the scientific way of thinking. He values the need for objective evidence and for the facts to inform policy. A big take away message he imparted to us was from his own previous mentor. He said that we need more scientists in politics, whereas we have mostly lawyers. The problem with this is lawyers are trained to form an opinion and defend that opinion whereas scientists are trained to seek evidence and them come to the best conclusion the evidence will support.

When we met with Representative Massie we were quickly shuttled off on a whirlwind tour of the capitol to glimpse a day in the life of a Congressman. We first headed to the floor where there was vote being held on the rules that would be engaged for a vote occuring on the next day. We rushed through the building going down elevators, up stairs, through a corridor that led to the Congressman train that carries people under the street connecting the congressional offices with the main capitol building. On the way Representative Massie described how the rules governing congress were modeled after the British Parliament and there were rules in place governing how votes would proceed. But then essentially every vote that comes around they throw these established rules out the window and vote on a set of rule for each particular vote. So they end up having two votes for every bill. The bill that Representative Massie would eventually be voting on was the “Pre-existing Conditions Bill” but he complained there was a lot of other stuff in that bill. As we walked Representative Massie would greet fellow Representatives including Andy Harris who was an Anesthesiologist in a former life. Massie joked with Harris he would “prefer most powerful man in office” to be his slogan rather than most notorious. When rushed up a fancy set of stairs approaching the voting corridor and there we passed blood stains we were informed were from someone who had been shot. He joked with a reporter he knew that it was one of his people who had shot one of Massie’s people (a reporter shot a Congressman decades ago). This could explain the heightened security where we were stripped of our cell phones, and even notepads and pens, when entering the floor of the House. We were just in time for Massie to vote, they are given 15 minutes to vote with a 15 minute grace period. We watched the vote and scouted for Representatives we knew. Alexandria Ocasio-Cortez from New York, the youngest female representative ever, was present in a pink suit and waved to us in the stands after we vigorously worked to get her attention. As Massie had explained, the representatives were all mulling around the floor talking to people. It was described that they would not be discussing the current vote but other legislation that is in the works and trying to garner support and consensus. The Representatives can behave in the way you would expect from high school students. They cluster with the same groups day in and day out, they talk to the same people, and each lunch with the same people. Several groups cluster in powerful ways. The two representatives from Wyoming stick together on most issues. There is a large group of Republicans from Texas that will agree to vote in a certain direction and because of their numbers they can drive the Republican platform in a certain direction. Similarly the Californian Democrats and the New York Democrats hold a lot of sway when they band together on an issue. There are special interest groups such as the black caucus that vote together across issues. Representative Massie prefers to vote independently across issues. He believes in evaluating each idea on its own merits rather than how it benefits a certain interest group or member of the group. That being said, Massie did form his own caucus to protect the second

amendment, an issue he is very passionate about. He has hired a staffer just out of undergrad from Florida to work directly on this issue. In the opinion of this staffer, the people working on the hill are more incompetent than they are malevolent. They are not evil people trying to pursue some master plan, just people with incomplete knowledge and ideas.

After leaving behind floor of the House we went on a “running tour” of the capitol building. This led us under the dome of the capitol building. We passed reporters who were conducting interviews in the hallways and we were informed that because they use such bright lights the person being interviewed cannot even see the person asking questions. This leads the person being interviewed to come across a little stupid because they cannot see the visual clues from the questioner and there is a lag between the end of the question and when they start to answer. We passed many tour groups of children but we had a unique destination ahead. We passed by House Speaker Nancy Pelosi’s office and onto the speaker balcony. This balcony sits in the center of the capitol building and is reserved for the guests of the speaker. Speaker Pelosi, the same as her predecessors, allows all congressman to share the balcony with their guests, regardless of political party. After a group photo on the balcony we started our trek over to the Judiciary Committee where Representative Massie was hoping to break with protocols and get to ask a question despite not being on the committee. On our way we were entreated to some of the stories of Massie’s time in office. Apparently former speaker of the house John Boehner was very strict about what clothing was appropriate for Congressman to wear. He expected Congressman to always be in suits and ties. Well Mr. Massie being a good citizen of Kentucky likes to wear his cowboy boots along with several other senators who would wear jeans and hide from Boehner to avoid being scolded. Boehner at one point caught Massie wearing his cowboy boots and made a comment about what sort of “cowboy club” was this. Massie responded that he was the only cowboy here that actually has cows. Despite what came across as a collegiality the Massie shared with Boehner and his fellow representatives he did lead a motion to vacate the chair, an act to remove Boehner from his speaker position, three times. He also posted a draft of a vote of no contest online for people to read and voice their opinions. By posting it online Massie hoped to build up pressure to oust Boehner.

We finally made it to the Judiciary Committee hearing where we were all able to sit in the audience while Representative Massie went to speak to a fellow representative on the committee, Mr. Jordan. The hearing was over many concerns about patent trolls, particularly from China, flooding the patent office and making it very difficult for Americans with honest claims to patents to get the patents that they deserved. The Judiciary Committee was interviewing the Director of the patent office, Andrei Iancu, gathering information about the ext to the problems they have been hearing about and trying to determine of there legislative actions they should take to help improve the situation. Some of the questions and the responses we heard included: (1) Is there a lack of consistency between existing patent laws? Answer: There is no clear test, and there is confusion in the application process. They are working to synthesis existing laws and have received good feedback for this new framework across the technological spectrum. (2) Are there scam patent applications blocking legitimate applications? Answer: It has been a big problem and they are trying to address it by increasing training for screeners to spot problematic applicants and use technology to detect photoshopped figures. (3) Is the patent office working on ways to improve ETO and PPH

participation with Brazil which would be good for my constituents? Answer: They are working to expand PPH and collaborations. He meets regularly with his counterparts in other countries to address this. (4) Has the trademark filings increased in past couple years dramatically? Yes.

Mr. Jordan from Ohio was then recognized to ask his questions, for which he did on behalf of himself and Mr. Massie. He was only allotted 5 minutes, as were all representatives, giving little time to ask a careful question or receive a quality answer. His personal question was in regard to how the patent office was guarding the patent ecosystem to make it possible to change the process more expediently. His second question on behalf of Mr. Massie, a multi-patent holder himself, asked how PTAB was supposed to encourage the innovator when such a high percentage of courts invalidate themselves and there is a lower standard of proof to invalidate. Due to time limitations Mr. Iancu was not able to answer either question and would instead be reporting back the answers to these questions in writing.

After Mr. Massie's question was asked we departed the hearing and wrapped up our time with the Representative. He shared some last bits of wisdom to us as scientists, encouraging us to seek public service. We discussed how a lot of how Congress works is a theater but it is important to follow the evidence. That is why he is supporting a bill with 60 democrat co-sponsors to block Trump from committing troops to Venezuela without Congressional approval. He was taking his case to Fox news, which could be viewed as a theater but communicating is essential and finding a microphone to reach out to the people is essential. He advises his fellow congressmen to go back and ask their constituents about some of the positions they hold for very partisan reasons and that questioning sometimes leads them to see the evidence does not support their position. We ended with a characteristic funny anecdote. Mr. Massie told us the story that we has co-sponsored legislation with liberals to make it legal for people to buy unpasteurized milk. This is a popular topic among liberals who believe in eating less processed foods. Mr. Massie supports this because he believes in the freedom of people to choose what milk they buy and drink. The milk lobby is however very opposed to the idea. When he told this story to his wife her comment was: "OMG, I didn't know the lactose lobby was so intolerant."

National Science Foundation
5/9/19

On Thursday, May 9th, 2019, the Harvard GSAS Science Policy Group met with the National Science Foundation (NSF) at their headquarters in Arlington, VA. We met with a panel of 5 members: Lloyd Whitman, Chinonye Whitley, Cherise Richardson, John Cruickshank, and Nirmala Kannankutty(host). Each panel member spent about 10 minutes introducing themselves and their path to NSF. Questions were asked by Harvard Scipol members in-between introductions.

Lloyd Whitman:
Dr. Whitman is the Assistant to the Director for Science and Policy and Planning. He discussed his background in physics and naval research, followed by working for different positions in science management, before working on the Hill for the executive branch. Dr. Whitman brought up an interesting distinction in the Science policy world in that you can either do science to inform policy, or you can do policy of science. The first involves questions directed towards understanding the issues that we are facing and how we can use science to improve situations. The later is concerned about how we can make policies to prioritize the types of research we are doing. He concluded his introduction by talking about how the NSF's mission is to think of the "broader implications of research."

Chinonye Whitley
Dr. Whitley, also known as ChiChi, discussed her science background in Cancer biology/ yeast genetics. After receiving her Ph.D, she worked as a consultant for a biotech for a few years and then became an admissions officer to increase diversity in STEM graduate programs. After a few years in this position, she wanted to move to a national level and applied to the NSF. There, she is continuing to encourage diversity in STEM graduate programs and is head of the I-Corps program, to help prepare scientists for careers in entrepreneurship or taking basic science to commercialization. She also encouraged everyone under NSF funding to participate and take advantage of the opportunity.

Q: What are some of the skills we can gain in graduate school to exceed in a career in science policy?
A: Cherise discussed how a graduate education is an important time for us to hone our sense of self motivation, to learn the culture of science and excel. She also emphasized the importance of learning how to analyze large data sets, manage many experiments, and communicate science well.

Charisse Carney-Nunes
Charisse Carney-Nunes has a law degree from the Harvard Law School and worked as a litigation attorney for many years before coming to NSF. She previously worked for the Senate Commerce Society and the Senate Committee for Science and Technology, before joining the NSF and working to increase diversity in STEM programs around the country.

John Cruickshank
John Cruickshank has been a member of the NSF for over 33 years and still seemed very passionate and excited about his work as he believes the foundation funds the most exciting research. He is a social scientist, who studied Indigenous learning, and is interested in the complex research on the "science of a human." He holds many job titles, including being the research advisor to many US domains, such as territories in the South Pacific and Hawaii. He highlighted 3 important skills that he thinks we should gain in graduate school for a career in science policy:

1) Hone our communication skills
2) He highlighted the word: Convergence, to remember that the interplay of different fields of science are extremely important blending science and policy. He also suggested building a collaborative network and actively seeking mentorship.
3) Network! Leverage social media.

Q: How can we improve our communication skills? /Add tangible experiences to our CV
A: Observe when others give a great talk- what did they do that made it great? Learn from others, practice public speaking, outreach to other groups, go to meetings between different groups of people to hear how they speak to each other.

Nirmala Kannankutty

Dr. Kannankutty is the director of graduate education and was the contact for us for this meeting. He discussed her role in analyzing science education in the US, by researching where PhD scientists go after they graduate. She also drew the “pi chart of competency”: