Catalyzing Computing Episode 11 - Federal Funding for Science with Peter Harsha

The transcript below is lightly edited for readability. Listen to “Federal Funding for Science with Peter Harsha” here.

[Intro - 00:10]

Khari: Hello, I'm your host, Khari Douglas, and welcome to Catalyzing Computing, the official podcast of the Computing Community Consortium. The Computing Community Consortium, or CCC for short, is a programmatic committee of the Computing Research Association. The mission of the CCC is to catalyze the computing research community and enable the pursuit of innovative, high-impact research.

In this episode, I sit down with Peter Harsha, the Director of Government Affairs for the Computing Research Association, an organization which represents 200 North American academic departments of computer science, computer engineering and related fields, as well as, 26 industrial research labs and six affiliated professional societies. In his position, Peter works to help CRA influence computing research policy by improving public and policymaker understanding of the nature of research and by increasing the computing

community's awareness of and participation in policy issues. In this episode, we discuss his experience working for Congress, the federal funding environment for science research, and his work with CRA and CCC programs, including the Leadership in Science Policy Institute and Congressional Fly-in. Enjoy.

[Peter's Background and Working Capitol Hill - 01:14]

Khari: So here with the CRA Director of Government Affairs, Peter Harsha. How are you doing today?

Peter: I'm doing great. Thanks for having me on.

Khari: Sure. Can you give us a little bit of background about how you first got involved with CRA and your history with the organization?

Peter: Sure. This is my 18th year that I've been working for CRA. Prior to that, I was a member of the professional staff of the House Committee on Science, and I worked for the Subcommittee on Research, which had, as part of its portfolio, oversight over the whole Networking and Information Technology Research and Development Program (NITRD). So I was really familiar with the IT research and development portfolio when I decided I no longer wanted to work 80 hour weeks for very little pay...

[Laughter]

Joining an organization like CRA seemed like a really good fit at the time, and it turned out to be a great fit, because, like I say, I've been here 18 years now and I'm really enjoying my time.

Khari: Okay. So prior to working on the Hill, how did you get involved with technology and policy?

Peter: It was kind of a serendipitous path. I grew up in Southern California. I was a pretty wonky kid. I really like politics. And in an area that was fairly progressive, fairly liberal, I was a pretty conservative kid — I had the Reagan/Bush bumper stickers on my high school notebooks and stuff like that. But I was also the kid of parents who were very scientifically minded. My dad's an engineer and my mom was a biologist, so I felt like I was the "science skips a generation or something." I knew how to speak science, but I didn't do science or anything.

I went to a fairly politically connected school in Michigan for college — a tiny little liberal arts school — and ended up getting an internship in Washington with our local representative. That became a full time job. While I was still in school and my wife was in graduate school, I worked in his district. So I got to know what district politics was really like and how crazy the concerns of constituents can be.

Then, out of pure luck, he sort of became the default chair of the Subcommittee on Research for the House Science Committee. And all committee chairs, when they get to the position believe — well every member of Congress believes — they're one staffer away from being Speaker of the House. If only they had that super staffer, the Ph.D who knows politics inside and out, knows all the players on the Hill, and can make him a real player in the space. I wasn't that guy, but when he couldn't find that guy, I said, "You know what? I could probably help out a lot on the Science Committee for you because I can speak science and I can also communicate reasonably well."

Khari: Wait. So they all think they're a staffer away from being the Speaker of the House?

Peter: Every member of Congress believes in the back of their minds that they are probably one really solid staffer away from becoming Speaker of the House, or President, or Governor of their State or wherever if they could just isolate….so every hiring practice on the Hill becomes this exercise in trying to find the super staffer.

Khari: I would not have thought that that would be contingent on finding one staffer.

Peter: It’s not.

[Laughter]

Peter: In reality, it is not. There are tons of other factors at play, but that's the easiest thing they can control for now, you know — otherwise they have to fix their own personality, politics, fundraising, and all that sort of stuff.

But there are some really, really fine staffers out there, and, like I said, my boss said he couldn't find one of those guys so he picked me to go up there. So we moved out to Washington and I worked for the Science Committee for a few Congresses. It was a pretty heady job.

Khari: So a lot of people that listen to this probably don't have a lot of experience in D.C. or know what it's like to work on the Hill. Can you talk a little bit about your day-to-day life if you are a congressional staffer, and how that plays out?

Peter: It’s pretty crazy. I mean, it's crazy in a couple of different dimensions. So first of all, it's a crap job in the sense that you work like 60 to 80 hours a week and you get paid a pittance, because part of what members of Congress like to do, especially on the conservative side, is tout how little they spend of taxpayer dollars in their offices, and that includes for salaries. So you generally start off as an intern working for free, although that's changing now. More internships are being paid on the Hill, which is great. I started working for free, but the payoff for working for free is that you get access to this world of people and information that's just amazing. The fact that Congress has this power to impose regulations on people or laws means people call you back.

So as an intern in college being told, “Get the President of the New York Stock Exchange on the phone I want to ask him a question” and being able to have that phone call returned. Like sitting in your little intern desk, which is like a 3/4 size version of a regular desk, and having someone tell you, “Peter, the President of the New York Stock Exchange is on the line for you.”

[Laughter]

It’s pretty heady.

Khari: Yeah.

So as you move from the personal offices, which are mostly about serving constituents and working on the members particular priorities, to the committee staff, which is where actual legislation gets written and passed and moves through the process, it gets even more interesting and more exciting because, number one, you have access to the best people in the world. You can call upon anybody and they'll give you their advice or their input. But you actually get to write stuff that becomes law, which scared my mom.

[Laughter]

Peter: The first bill I ever had anything to do with this was a bill for the United States Fire Administration, which is not a hugely consequential agency, but it was my piece of the portfolio, and it got signed. The President, Clinton at the time, signed it.

So I got to call it my mom and say, “I got my first bill signed.”

She went, “They’re letting you write bills now?”

I said, “Well, yeah, that's kind of my job now.”

She said “Do they know you're an English major?”

[Laughter]

Peter: “Yes. Yes, mom.”

Khari: That's a key skill, writing, right?

Peter: It totally is. That's what sort of got me my job. I think most of the people you'll find who have successful careers, both on the Hill and off the Hill, tend to be good communicators, or try to be good communicators. Like I say, I went from that committee job, which I liked a lot, because it combined the really wonky part of things, like understanding who the players are in the political space; what sort of inputs drive the process and change things; who's up for which chairmanship and how that's all going to play out — it combined that with the tech policy stuff that I really like too, the real geeky side of things.

In a way, the job here with CRA has continued that. I get to talk to the smartest people in the world about where technology is going and I still get to play in that political space too, and understand the intersections between technology policy and politics and where the technologies that our institutions and our members are producing, how they run up against regulations or run up against funding issues. So it's a really exciting place to be right now.

[How a Bill Gets Passed - 7:58]

Khari: Yeah. So we'll dive deeper into the funding question in a second, but going kind of Schoolhouse Rock Class 201, can you explain how a bill gets written?

Peter: Sure. Let's talk about funding bills, because that's a more regular process. So you have a bill that gets developed in the House. It sets funding levels for particular agencies. We can talk about how all those bills are divided up, but basically there are 12 bills that fund the entire federal government and every federal agency that gets discretionary money appears in one of these bills. It's Congress's job to pass them every year. They don't do a great job of that and that's why we end up in shutdowns and all sorts of stuff like that. But it's their job to start.

So the House will introduce a bill — for an appropriations bill, it'll be the subcommittee chair for that particular appropriations committee. So for science agencies, the one we care a lot about is the Commerce, Justice, Science Appropriations Bill, because that includes funding for NSF (National Science Foundation), NASA (National Aeronautics and Space Administration), NIST (National Institute of Standards and Technology) and NOAA (National Oceanic and Atmospheric Administration). The chair of that committee will introduce the version of the bill and all the committee members get to mark it up.

So they'll have a markup session where everybody gets to add their input to it, amendments are made, language is changed in the bill. The committee will vote that out of its subcommittee, the full committee takes it up, does the same process again, marks it up — it's usually a little quicker — and then the full committee. It'll pass out of the full committee and then it goes to the House floor. The whole House gets to vote on it — same process, members can make amendments to it.

Appropriations are kind of a zero-sum game because there's a limited pot of money to spend and once money is in an appropriations bill...if say, the National Science Foundation didn't get enough money in that bill, if we want to see them get more money, we have to find a place elsewhere in that bill to take money from in order to give it to the

National Science Foundation. So that means the National Science Foundation finds itself in competition with other science agencies, but also the Department of Justice, the Census Department and all sorts of stuff, which makes for really strange arguments sometimes. But if the whole House approves it, the Senate takes up its version of the same bill, and does the same whole process on the Senate side.

If it passes in the Senate, they reconcile the two different bills in what's called a conference committee, where members from both chambers sit down around a table and horse trade on what provisions that are different in the bill get included. They end up with a compromise bill that both chambers agree on and approve. If they approve it, the President signs it and away we go: we have funding for that particular agency.

What's happened recently, least in the appropriations process, is at some point in that process — whether it's the Senate passing the bill, or the House and Senate agreeing on a conference agreement, or the President agreeing that they're going to sign it — it breaks down and we end up with a government that doesn't have funding for particular parts of it as long as that bill is unfinished. That's why we had our last 35 day shut down.

[How Funding Agencies Prioritize - 10:35]

Khari: So you just explained how a funding bill gets passed. Can you talk about how different funding agencies prioritize different kinds of research or different kinds of funding? I'm sure a lot of our listeners are applying for NSF grants, or maybe DARPA, maybe NIH.

Peter: Yeah. There are lots of different inputs into that kind of prioritization process. There is the grassroots part, which is, agencies are responsive to their constituencies. So, in the case of NSF, ideas that come from the community get addressed in the prioritization process at some point. There are other mission agencies that are focused on serving a particular community, like veterans, or solving particular problems, like

health. And there are advisory sorts of processes within there to let the community that they serve put input into the process. There's also top-down prioritization too, which comes from both the administration, which oversees all the agencies that it can come from — in the case of the science agencies, a place like the Office of Science and Technology Policy (OSTP). This is where the advice to the President sort of lives in the Executive Branch and [OSTP] can prioritize certain areas of research; for example, the most recent guidance memo that came out from OSTP prioritized a number of different science areas, including artificial intelligence, machine learning, advanced manufacturing, quantum science, 5G, and other things. The agencies take that advice to heart, both in part because it's well-considered and they should, but also because ultimately the agencies are going to have to submit their budgets to the White House Office of Management and Budget, which will have the final say in what each agency gets to put in its budget. And so if the agencies are not being responsive to OSTP and OMB, the agencies will find their budgets amended.

So those are two sources. But also, Congress obviously has a role to play in this as well. Congress can weigh in formally either with legislation or report language that directs agencies to do particular things and prioritizes particular things. But they could also do it a lot less formally, just by holding hearings on the issue and bringing in members of the agency or assistant directors or program managers and asking questions about why they're funding the things that they fund and perhaps giving them advice on what they ought to fund instead. That happens quite a lot too. So lots of different inputs. And it's really up to the agencies themselves to prioritize those inputs and figure out what the priorities for the agency would be, but, in general, they really have to serve their mission.

The agencies are chartered for a particular purpose. The National Science Foundation is kind of interesting and it's the only one that started expressly for advancing the progress of science. They have a kind of a broad mission, but DARPA has the mission

of preventing technological surprise in terms of national security and the military. NIH has a health oriented mission and so on and so forth.

Khari: So what funding priorities have you seen change a lot over your career? Like, obviously, AI is a hot area right now. What was AI 15 years ago? Maybe it was still AI...

Peter: It is. Generally, everything has a cycle. So every major technology that we would think of as part of the IT economy right now, probably had its moment in the sun in terms of budget priority at some point. I mean, that's not universally true, there are some that maybe have snuck through. But like I say, in the past 18 or 20 years or so that I've been working in this space. it's been everything from networking technologies, to supercomputing, big data, AI, and quantum. Who knows where we're going from there?

It could be thermodynamic computing, it could be…who knows? For the most part, Congress and the agencies don't want to say they're a totally lagging indicator on that sort of stuff; but when you see something getting a priority it usually means that there's already a great center of effort around that particular technology and there are a lot of people working in that area, because there has to be a certain level of noise reached in the area for Congress and the agencies to really pay attention. I think there are a few agencies that are really forward looking like DARPA and NSF and some others, but for the most part they tend to be a little bit more responsive.

Khari: From a staffing perspective, what would you recommend in terms of staffing on the Hill to better be able to respond to emerging technologies. At AAAS a couple of weeks ago, David Mussington from University of Maryland, made the point that a lot of career government officials don't have a science background and therefore are unprepared to evaluate, in this case, cybersecurity issues. That could be applicable to a lot of things, quantum computing, etc, so...

Peter: Yeah, that's a big challenge for Congress. Getting technical advice into Congress, trusted technical advice, is a real problem because...I mentioned the pay scales on Congress, they're not great. Anyone fairly decent in the computing area has probably got a pretty good deal somewhere...

[Laughter]

...so it is difficult to entice people to come and spend time in DC, especially in policymaker's offices or serving in agencies. I mean, not only is it a hit to the pocketbook, but in a really competitive field like computing, you know, taking a year or two out of your research career, especially if you're pre-tenure, can derail you.

I think, in that sense, we've kind of undertaken some efforts to raise the temperature around an appreciation for policy in the computing space with stuff like our Leadership and Science Policy Institute program (LISPI), which our Government Affairs Committee runs in conjunction with CCC. The idea here is to kind of sensitize a cadre of the community to the importance of science policy and to create a real understanding of how science policy gets made. The hope is that once they graduate from there, they can take their skills — maybe not on a permanent basis, but — to DC and take advantage of sabbatical years or whatever to put in time in a congressional office or maybe in an agency. Maybe even a traditionally non-science agency, like one of the mission agencies, like the Federal Trade Commission or somewhere where they desperately need technical advice to understand all the dimensions of the problems that they're facing in the regulatory space. I mean, it's a real challenge.

There are a number of other programs out there that are trying to address it. AAAS has a longstanding Science Policy Fellowship Program that places people in Congressional Offices. A lot of those science policy fellows never leave DC. They come out and they enjoy the policymaking process enough that they stick around. We used to joke that

they were all scientists who otherwise would be doing postdocs for the rest of their life, and that's in part a little bit true. But there are other efforts, like there's a new program called Tech Congress. It looks for fellowship applicants and then places them in Congressional Offices, specifically in the computing areas, which is new. And they've had a reasonable amount of success at finding people who are willing to do it. But it's true that the better advice that we can get into Congress, hopefully, the better legislation and regulation that results from it. So it does behoove us as a citizenry to get our technical people engaged with policymakers.

[CRA's LISPI and Congressional Fly-in Programs - 17:59]

Khari: Yeah. So you brought up LISPI, which CCC sponsors and [CRA's] Government Affairs runs. So can you talk a little bit about that program? And if people are interested in applying...

Peter: Absolutely. So, LISPI is a one and a half day workshop. We call it Civics 601 instead of Civics 101. It's really about how federal science policy is made. The real meat of the sausage making process. That's a horrible metaphor. But anyway, the ins and outs. We have folks from the White House, we have folks from federal agencies, we have folks from Congress who all share their expertise on how the priorities are set, how the process itself works, and where are the inflection points in the process that you can have influence.

We also have folks like me who are a kind of science advocate professionals that can help you discover the best ways of crafting your particular story or your ask. We even do kind of a "murder board" where we have three folks set up to listen to pitches from the participants at the workshop and get real-time critique. It's sort of an American Idol-ish kind of approach :three judges who listen to your pitch and tell you honestly what we think.

Khari: Would you say you are Simon Cowell in this metaphor?

Peter: I think I'm Randy Jackson. I do a lot of, you know, “Yo, what up dog?” in it.

[Laughter]
But that tends to be the highest rated part of the workshop because it's a real practical experience. And the three folks who we usually have do it, we’re all former congressional staffers so we've heard a thousand of these pitches. It tends to be really useful in honing that muscle, which maybe you don't use so much in your academic life.

But maybe you ought to be good at it, because if you want to become a leader in the field, you need to understand how to sell this part of your research. It's not all about advocacy and salesmanship, it's a lot about understanding the process too. But being able to communicate your work to say, your neighbor. To communicate the importance of it as if you just took 30% of his paycheck to pay for it is a really important skill and it will serve you well, I argue, in other parts of your academic life. It will certainly help you write better grant proposals if you think about your research in those terms.

Khari: In addition to LSPI, there's also the Congressional Fly-in Program, which is twice a year. Is that correct?

Peter: Well, we do one for our board members in February and then yeah, we do a kind of a general membership one in September. This is a great opportunity for folks at our member institutions to come on out on their own dime and make the case for computing research in Washington to members of their own congressional delegation. So you'll meet the people who represent you in DC.

The importance of this particular event is not necessarily that you're out there asking for money. It's more that you're trying to make yourself known to those offices and trying to get to know those offices so that there's a relationship there that can be counted on in

the future. And those relationships play out in really interesting ways. It's impossible to predict in advance how it will work out, but they can result in somebody being invited to testify at a hearing because they know that this great person in their district understands computer science. Or it could mean an invitation to go serve on an advisory committee somewhere, like a federal advisory committee. It could also just mean asking for help on how to program their webpage. The needs are vast in congressional offices and like I say, it's impossible to predict the outcomes of any of these meetings, but they're all generally positive. And we've gotten reasonably rave reviews from the people who participate and we get a lot of repeat visitors.

But anyway, what we will do is we will train you up. So come out the afternoon before and we'll do a one hour orientation session with everybody. We'll give you the materials that you would use in that visit, the talking points and any charts and graphs we want you to show. Then we will ply you with food and alcohol so you are in a great mood for the next day, where you'll have a series of meetings, generally three to six meetings, that we will set up for you and give you all the important details about. And then you'll just go up and really make the case for computing research by really just talking about the stuff that you're already doing at your own institutions. Talking about the relevance of that work to the country and the world and how important the federal contribution to that research really was.

[Tire Tracks Diagram of IT Economy - 22:28]

Khari: So having gone to a couple of these myself, I know a key part of the sales pitch is the Tire Tracks Diagram, which is from a National Academies study. I mean, podcasting is not a visual medium, but for people who are unaware of this, can you sort of explain it?

Peter: Oh, this will be good, trying to visually describe it.

Khari: And then I guess where people can find it.

Peter: Yeah. So the first thing is you could go to the Government Affairs website, which is cra.org/govaffairs and under there there's an advocacy tag and on the advocacy page you'll see about three quarters of the way down the page a link for the Tire Tracks Chart and other congressional visiting charts.

It's called the Tire Tracks Chart because there's a whole bunch of series of lines with arrows and things that go back and forth. Basically, it's a timeline and it tries to take the IT economy and divide it into a whole bunch of different subfields. For each subfield, like AI and Robotics, or Big Data, or microprocessors, it traces the development of that area along three different lines. The first one is when work in that area was being done in U.S. universities, largely funded with federal money. The second line is when work was going on in industrial research labs, generally with private sector money. The third line starts as a little dotted line representing when the first product in that space was introduced, so when it became a commercial product. Then the line turns solid when that becomes a billion dollar sector of the economy. And then it becomes double thick when it becomes a 10 billion dollar sector of the IT economy.

This chart is littered with these lines showing a lot of things, but mostly making the case for basic research for us, which is essentially: research often takes a long time before it pays off, especially fundamental research. And you can see it all over the chart. That research at U.S. universities in an area often started 10, 15, 20 years before the first product was introduced in the space. It also shows that research between U.S. universities and industry...[the research] is of a different character, they don't supplant one another.

Work in U.S. universities tends to be much longer range. Like I say, it could be 15, 20 years before something pays off in the space. The industry side tends to be geared more towards product cycles. So maybe two product cycles ahead, maybe three

product cycles ahead. And it also shows that the real sort of vibrancy in this ecosystem that the chart describes is in the flow of people and ideas between all these different areas. So universities breed people in these areas that go to industrial labs, industrial labs send people and ideas back to US research institutions for problems that need solving and there's a fair amount of serendipity involved. So you'll see arrows that jump from one area all the way across to another, often serendipitously. The innovations in one space completely re-energized another space and you see that all over the chart as well.

The other aspect of the chart, which if I were showing it to you, I would point out at the very top of the charts is a whole list of companies — you'd recognize every one of them — Fortune 500 companies that are sort of roughly aligned above the subsectors that they emerge from. And the point there is just pretty obvious: that these companies owe a lot of the innovation that developed the products that defined them to this vibrant ecosystem, which has at its core federal support for research in it.

So we argue that the chart shows that basically every innovation, every change to the U.S. standard of living, everything that information technology has has done for us, every one of those technologies bears at some point the stamp of a federal support. So that's what's really crucial for our policymakers to understand, because usually if we go into an office and talk about research funding with policymakers they all often say, “Well, this is great. Clearly, companies have this all figured out because they're making trillions of dollars.” I mean, literally the first nine companies on that list at the top of the Tire Tracks Chart represent about a trillion dollars in GDP. So why in the world does the federal government need to be involved in this work if the companies have it taken care of? So the chart is a really good way of showing, “Well, it's this symbiotic sort of relationship.” This is really a long term focus that the federal government takes care of, the more kind of short term technology transfer-ish focus that the industry works on. And it's formed this extraordinarily productive interplay that has made the U.S. the world leader and a leader in IT and in lots of other really strategically important areas.

Khari: Yeah, the classic example of that is Google, right? Which was funded through, was that a DARPA...

Peter: NSF, I think. Digital libraries.

So interestingly — I don't know if this is a diversion — but we're part of coalitions of groups like CRA that argue on behalf of science funding from the federal government. And one of these coalitions actually put together some focus groups, some actual social scientists to get a whole bunch of people in the room across the country and lots of different locations to talk about the arguments that we usually make for science. One of them is the Google story, to say that this small NSF grant paid off in this gigantic company called Google. And the pushback that we got from the focus group was don't use a Google example because then people just think taxpayers made Sergey Brin and Larry Page rich and gloss over the fact that Google generates how many umpteen trillions of dollars in taxes over its lifetime, assuming it pays all taxes. But anyway, I always thought that was interesting because we love the Google story. The computing research community tends to be the poster child for making the case for research in town because there's a really clear chain between the fundamental research that we do and our institutions and the products that result. Every member of Congress has an iPad or an iPhone. They can hold this thing in their hand that they didn't have 10 years ago that gives them all the knowledge in the world available to them at any time.

So we're often the group that all the other groups trot in first to make the case, because it's much harder for, say, the physics community to argue about the relevance of the Higgs boson in terms of federal priority setting. We're very tangible, but at the same time, when we go in there, we're arguing for the whole endeavor of science, not just computing. I mean, recently we make the case a lot about the social sciences and how important the social sciences are to advancement in computer science and computing research. You can't solve problems in cybersecurity, for example, unless you know how

people behave. Artificial intelligence makes it even more crucial. The problems that we face they're going to require a really good understanding of ethics and understanding of incentives and all sorts of good stuff. That's going to come from the social sciences and even the humanities. So we try to make a rising tide floats all boats kind of case whenever we go up and talk. And I think that's probably the best way to move forward. It's served us well so far.

[Outro - 29:44]

Khari: That's it for this episode of Catalyzing Computing. Hope you enjoyed it. Tune in next week, as I continue my interview with Peter Harsha and we discuss the impact of the Federal Budget Sequestration, the U.S. Research Ecosystem and the history of the Computing Research Association. 'Till next time. Peace.