

As in all democratically constituted states, scientific policy advice to the legislature in the U.S. is faced with the challenges of this time: What can good advice look like given the rapidly developing new technologies and their far-reaching implications for society? Despite decades of collaboration between consultants and advisors, mutual trust must be won over and over again. Against this background, it is particularly interesting to take a closer look at current developments in the U.S.: Timothy M. Persons, GAO's Chief Scientist, gives insights into the work of the U.S. Government Accountability Office (GAO), which advises the U.S. Congress. It becomes clear that balanced results of technology assessment and other GAO products arise when not only the majority but also the minority party is heard when prioritizing congressional inquiries. The research questions must be impartial and meet congressional requirements. The interview was conducted by Constanze Scherz (ITAS-KIT).

TATuP: *In 2019 GAO launched a new Science, Technology Assessment, and Analytics team to better meet Congress' growing need for information. First of all, could you give us an insight into the size and features of GAO?*

Timothy M. Persons: GAO is an independent, nonpartisan agency that provides objective, reliable information to the U.S. Congress and federal agencies. We have a staff of over 3,000 and an annual budget of around \$635 million. In fiscal year 2019, we identified \$214.7 billion in financial benefits from our work – a return of about \$338 for every \$1 invested in us. We also contributed to more than 1,400 improvements in government programs and operations, including many related to science and technology programs or issues.

GAO has expertise in science and technology across a number of our teams, the primary one being the Science, Technology Assessment, and Analytics

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INTERVIEW

Nonpartisan advice for the U.S. Congress matters

Insights into the work
of the U.S. Government
Accountability Office (GAO)

(STAA) team. STAA has about 100 staff, at least 61 with an advanced degree in science, technology, engineering, or mathematics, and full access to dozens of other experts, including social scientists, economists, and attorneys.

What is the particular challenge in the U.S. context when scientists advise politicians, or federal administration on current technological developments?

Science is constantly evolving, and answers to research questions can take years or decades. Similarly, new technology often takes far longer to develop than we would like. Yet policymakers cannot wait for perfect information or perfect technology (if such things even exist). The central challenge of giving science and technology advice to government, in any nation, is to reconcile these differing time scales and to provide actionable information when so much is uncertain. The current pandemic has painfully reminded us of the need to make decisions based on imperfect knowledge, whether it's decisions about mask requirements,

social distancing, or how to develop vaccines quickly but safely.

No matter what is going on in the U.S., GAO's mission is to remain nonpartisan and objective. This is critical to our ability to support Congress in an era where scientific findings are often being viewed as inherently political.

Can you give an example of a recent GAO advice project and of how advice is brought to politicians and taken up in decision making?

GAO often generates advice in the form of recommendations to agencies of the U.S. federal government and, where appropriate, may propose matters for congressional consideration (i.e., identifying the possible need for statutory changes in law). Additionally, we've been providing science and technology policy advice by identifying and analyzing policy options in many of our technology assessments (TA). For example, we have an ongoing series of TAs on the use of artificial intelligence (AI) in health care (a series being conducted jointly with our country's National Academy of Medicine), and in December 2019 we looked at options for enhancing benefits and mitigating challenges with the use of AI in drug development. One notable option we looked at was for policymakers to create a system to provide broader access to high-quality data on drug compounds and their effects while protecting patient privacy. We think this sort of thing is key for policymakers: detailed analysis of the pros and cons of specific actions they might take.

This type of analysis of the pros and cons and making them available to policymakers also led to the establishment of TA in Germany and other Western European countries. Despite decades of collaboration between those who provide and those who request advice, we learned that mutual trust must be won over and over again. What consulting needs does the Congress bring to GAO?

You're right that human values like trust are critical, even with issues that may

seem to be purely technical or scientific. We are increasingly becoming a trusted source that helps Congress cope with information overload. We frequently get requests for short-term assistance, which we can often provide within a few hours or days. Not surprisingly, such requests for assistance commonly track to issues before the Congress, including COVID-19, antimicrobial resistance, telecommunications policy, energy issues, and the use of algorithms in forensic investigations.

And how does GAO handle these requests?

Generally speaking, we conduct more in-depth reviews when mandated in law, requested by Congress or, less frequently, on our own initiative. For congressional requests, which are the most common, GAO procedures prioritize the leaders of the committees with jurisdiction over an issue from both the majority and the minority parties. We then work to formulate a set of unbiased questions and reporting time frame that will meet the requester's needs. The STAA team has built a client base of dozens of congressional committees and subcommittees of the House and Senate, and the demand signal for our work has been increasing significantly – not only due to the pandemic, but because of the extensive array of science and technology issues we are facing.

Technological innovation, production and diffusion as well as social and environmental effects of technology are global phenomena. How does GAO cooperate with international TA institutions?

We live in a hyperconnected world that requires global technological cooperation in order to function. We do aim to increase our cooperation with international institutions. For one example to this end, we regularly contribute to the European Parliamentary Technology Assessment group, which has a running list of our recent work, and oftentimes features it on their homepage, eptanetwork.org. We have also regularly attended EPTA events and plan to continue to do

so. We are hopeful that this regular cooperation will continue indefinitely. We have presented to this group as recently as May 2020.

We are also connected with the International Network of Government Science

dom of the Netherlands, the Inter-American Development Bank, the World Bank, Statistics Netherlands, the Delegation of the EU to the U.S., the supreme audit institutions of Chile and Japan, as well as many other domestic groups.

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Advisers (INGSA), where we have explored new TA methods and approaches to ensure that we are increasing the absorption of our advice into the U.S. Congress. We contribute to INTOSAI's (the International Organization of Supreme Audit Institutions) Working Group on the Impact of Science and Technology on Auditing. In addition, we frequently brief international organizations and supreme audit institutions on the nexus of technology and policy. In the past year, we have presented to the Consulate of the King-

Over the past years a growing number of populist movements and authoritarian politicians have demonstrated their disregard for scientific findings. What is TA's role as a mediator between science, politics and society?

Technology assessment needs to be not only credible, but relevant to the urgent issues we face as a society. So we of course take no position on what policymakers should do, but with our technology assessments we try to show them why a technology is relevant and what might be the consequences of the various actions they might take. We also want to help foster greater mutual understanding between our technical disciplines and the rest of society. One of the great obstacles to this is uncertainty. It's inevitable in science and technology, but it can cause confusion for members of the public. So we always strive to clearly communicate what we know, how we know it, and what remains unknown.

In December 2019 the GAO Handbook for Key steps and Considerations in the Design for Technology Assessment was published. It provides approaches to select TA design and implementation challenges. One challenge in conducting TA is engaging all relevant internal and external stakeholders. Are there any projects in GAO where stakeholders were involved in the research process?

We involve external experts and stakeholders in all of our technology assess-



Dr. Timothy M. Persons

is the Chief Scientist of the U.S. Government Accountability Office (GAO). He leads a large interdisciplinary team which advises Congress and informs legislation on various topics such as artificial intelligence, sustainable chemistry, biosecurity, and 3D printing.

ments. One of the most important components of this is our partnership with the National Academies of Sciences, Engineering, and Medicine, which help us identify leading experts and bring them together to collaborate with us on most of our assessments and provide a framework for external reviews. We of course also include separate interviews with numerous experts and stakeholders, as well as literature reviews, and we engage with third-party external reviewers as part of our extensive quality assurance process.

In our handbook we discuss more collaborative options for involving external stakeholders beyond our expert meetings. There are some promising options, but as every TA institution in the world knows, there is a trade-off between timeliness and meeting the needs of the clients on the one hand, and the nature and extent of external review and engagement on the other. We also see internal stakeholders as critical, since science and technology is relevant to a large share of GAO's work. Throughout the course of a TA's development, we collaborate with relevant policy and subject matter experts, attorneys, methodologists, and economists within GAO to make sure we are on the right track and that we are addressing the relevant issues.

I found it very inspiring to learn that Crowdsourcing could be a practice of obtaining information or input into a task or project. Two GAO reports (GAO-17-507 and GAO-17-14) are about how other federal agencies could use open innovation in their own work. What could be the overall aim of these practices especially with regard to analyses in the context of TA?

We have not used crowdsourcing in TA, but it's something we might use in the future. I agree it's an exciting possibility. As scientists, we may be the experts in our field, but we need to be humble and remember that we are not experts in the impacts of science and technology across society. We need to draw on the wisdom of our citizens, who because of their diverse lived experiences and their sheer

numbers, are bound to have ideas that hadn't occurred to us.

In the last few months the debate about a possible reopening of the Office of Technology Assessment (OTA) in the U.S. has intensified again. In the paper "Science, Technology, and Democracy: Building a Modern Congressional Technology Assessment office" (authors: Zach Graves and Daniel Schumann; January 2020) three potential approaches were reflected, amongst other things a "hybrid approach wherein both GAO and a new OTA develop different capabilities and specifications". What would be the advantages and disadvantages of such a hybrid model?

We believe GAO is well positioned to meet the growing needs of Congress for science and technology information. We are about to mark our 100th anniversary of ensuring the accountability of the federal government, and this very much includes taxpayer spending on science and technology. We began doing TAs in 2002 and, as we grow our staff and expertise, we are rapidly expanding our capacity for technology assessment, as well as brief overview documents, such as two-page explainers called Science & Tech Spotlights, which we launched in 2019.

At the same time, if Congress decides to reopen OTA, we are ready to coordinate with them. Science and technology is such

cars by 2035 indicates a clear link between technology policies and environmental policies. How does GAO deal with issues of sustainability and environmental concerns?

Even though many of us now spend a lot of time in "virtual environments", the natural environment is what sustains life on Earth. GAO has produced several technology assessments focused on environmental issues, including climate engineering, sustainable chemistry, and water scarcity in agriculture, cities, and the energy sector. In addition, STAA collaborates regularly with a different GAO team that focuses on natural resources and the environment.

How was the feedback from parliamentarians to these reports?

We generally brief the Members of Congress who requested each report on the results, and we regularly hear that it met their needs for timely, relevant information. Environmental issues are often highly contested, and Congress is getting a lot of information from stakeholders. In fact, it's been called "the most advised body in the world". The Members routinely tell us that they value what we can give them because it comes with no agenda beyond supporting informed decisions. Our nonpartisan brand and extensive quality assurance processes are

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a vast topic that there is more than enough work to go around. It is ultimately up to Congress to decide on what agency apparatus will most efficiently and effectively deliver the products and services it needs.

The U.S. has been hit by a number of natural disasters and California's recent plan to ban the sale of new gas driven

trusted by both political parties since they do not view our work as thinly veiled lobbying or otherwise ideological or presuppositional in its premises.

In some cases, the impact of our reports can be seen through congressional action. For example, the year after our TA on sustainable chemistry, two of the Members who requested it, joined by two

other Members of Congress, introduced a bill that proposed some of the potential options included in our report. For example, the bill, H. R. 2051, would create a new entity to coordinate U.S. federal programs and activities in support of sustainable chemistry. It would also create a mechanism to support partnerships

created? What were the topics of the reports for the Congress on these questions?

In a world faced with an array of complex, adaptive, systems problems (e. g., cyber, food, financial, and health care insecurity) – including a deadly and disruptive

examine the potential adverse effects of the oil spill dispersants used in response to the Deepwater Horizon spill in 2010. We will also start work soon on two TAs related to per- and polyfluoroalkyl substances (PFAS) – a class of over 4,000 synthetic chemicals that are used in a wide range of commercial and consumer products. We anticipate additional TAs in the future on topics such as decarbonization technologies, the use of AI for environmental modeling, addressing energy-related waste, metrics for environmental restoration, and green building technologies. Finally, we will continue to produce Science & Tech Spotlights on topics where technology can contribute to progress on energy and the environment. We recently produced Spotlights on nuclear microreactors and consumer electronics recycling, and by the time this is published we expect another on air quality sensors.

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between institutions of higher education, nongovernmental organizations, consortia, or companies. The bill passed the House of Representatives in December 2019. It may not become law before the end of 2020, but it could be reintroduced after the new Congress is seated in 2021.

And would you say that the need for advice on environmental issues has in-

global pandemic – I would say that the need for nonpartisan, timely, and relevant TA on these and equally concerning environmental issues has increased substantially. STAA has seen a steady flow of requests for TAs and other science-related work relevant to the environment, including climate, sustainability, food, and water. For example, we are currently working with our environmental colleagues to

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