



RESEARCH MANAGEMENT

U.S. Rules on Accounting for Grants Amount to More Than a Hill of Beans

The latest government proposal exposes the problems facing scientists who strive to do good research without stepping over the line

Stalking a kidney gene defect could make Lisa Guay-Woodford a lawbreaker.

Like scientists everywhere, the pediatric nephrologist at the University of Alabama, Birmingham (UAB), knows that she can improve her chances of winning a grant from the National Institutes of Health (NIH) by including preliminary data in her application. But gathering those kidney data poses a dilemma for Guay-Woodford. Simply put, it's against the law to apply resources from an existing grant toward a new project. And Guay-Woodford knows that the U.S. government isn't playing games. Last spring, her university paid \$3.4 million to settle allegations that it overstated how much time and effort its scientists had devoted to certain federal grants.

These and other administrative rules about how universities spend government money are intended to guard against the misuse of taxpayer dollars, and they are being enforced more firmly than ever. In the past 3 years, for example, Harvard University, the Mayo Clinic, Northwestern University, Cornell University, and Johns Hopkins University have paid the Justice Department more than \$21 million to settle cases similar to UAB's. Although none of the schools has acknowledged committing a crime, scientists are increasingly concerned that the laws, for all their good intentions, don't square with how science is done. And many university administrators think that the gap is widening. In November, the Department of Health and Human Services (HHS) issued a notice urging more rigorous timekeeping and

beefed up research compliance programs (www.oig.hhs.gov/fraud/complianceguidance.html#1). The comment period closes on 30 January.

"There's a dynamic tension" between accountability and intellectual freedom, says Guay-Woodford, who has \$1.5 million in NIH grants this year and runs a seven-person lab. But she worries about the future of U.S. research if the bean counters prevail. "Where's the creative energy that has been the hallmark of science?" she asks. "Where's that going to go?"

"An elaborate fiction"

The federal government didn't always press scientists to follow its rules to the letter. The 1958 regulation under which time and effort reporting falls, known as circular A-21, allows for some flexibility, and "since no one was enforcing it, people shaded more on the latitude

"We want to be sure that we're getting what we're paying for."

—Karen Tiplady, NSF

of it," says Peter Anderson, a pathologist at UAB. University administrators asked Anderson to design an education program on the regulations for faculty after UAB's settlement with the Justice Department.

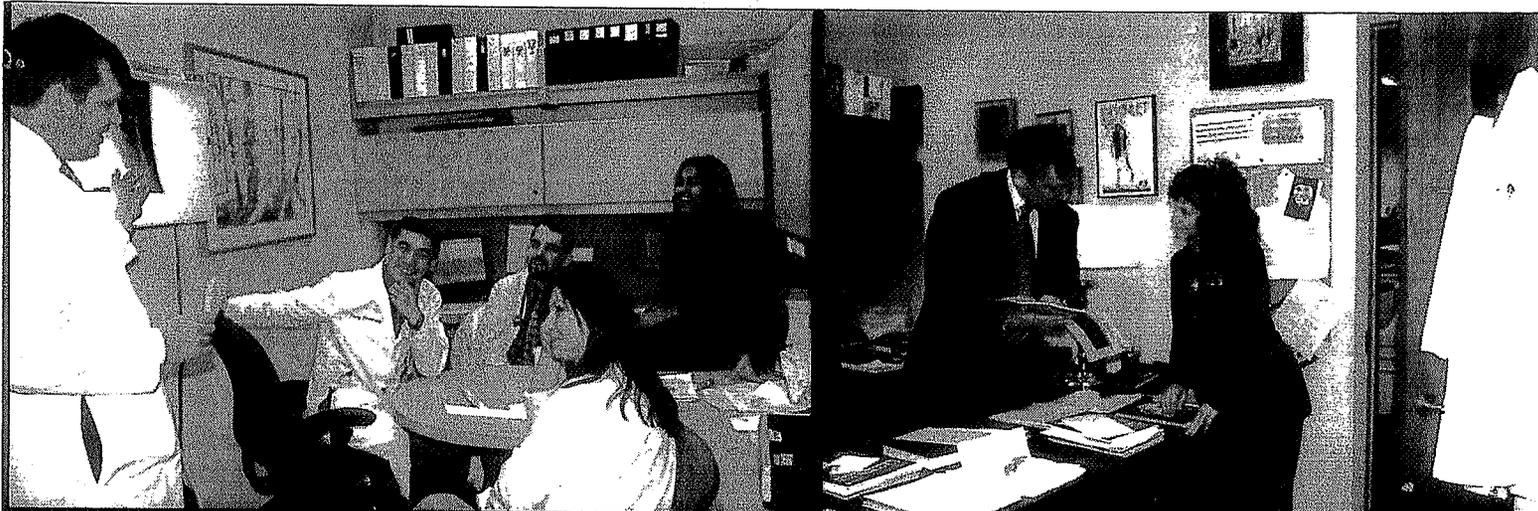
But federal attitudes appear to have stiffened in recent years. The process began in

February 2003, when Northwestern University in Evanston, Illinois, agreed to settle government claims that its scientists had spent less time than promised on federally funded research. "Federal agencies are [now] less willing to treat universities differently than they would treat a defense contractor" with regard to documenting costs and time spent on projects, says Robert Kenney, director of the grants and contracts group at the Washington, D.C., law firm Hogan & Hartson, which has defended several institutions sued by the government.

Federal agencies such as NIH and the National Science Foundation (NSF), which dispense billions of dollars each year in academic research grants, require applicants to estimate how much time they will spend on a particular project and, if successful, to notify the funder if their workload changes during the course of the project. In other words, a 25% commitment means 10 hours in a 40-hour workweek, or 20 hours in a scientist's more typical 80-hour week. Because weekly schedules fluctuate, with commitments added and dropped, schools tend to ask for records only once a quarter or even less often.

Government officials say that the accounting practices, although burdensome, are crucial. "We want to be sure that we're getting what we're paying for," says Karen Tiplady, chief of the cost-analysis and audit-resolution branch at NSF. The estimates guide funding decisions by determining whether an experiment's goals are achievable and whether a project is appealing. "If the principal investigator is going to be very strongly involved in the intellectual leadership of the project, NIH wants to be assured that that person is spending sufficient time" on it, says Donna Dean, who helped oversee extramural research funding at NIH before becoming senior science adviser at Lewis-Burke Associates, a Washington, D.C., consulting firm.

CREDITS (LEFT TO RIGHT): ANN HAMILTON/ATLANTA VA MEDICAL CENTER



All in a Day's Work

Atlanta cardiologist Samuel Dudley juggles caring for patients, doing basic research on heart-rhythm disorders, teaching students, and performing administrative duties during one recent 12-hour day.

A fundamental assumption of both the laws and the new HHS guidance is that it's relatively easy for scientists to allocate their time among various projects. But, researchers note, the boxes on the forms don't always mesh with the real world. Take the hectic life of cardiologist Samuel Dudley. His 14-person lab at the Atlanta VA Medical Center in Georgia runs on grants from NIH, the Veterans Administration, and the American Heart Association, each with its own set of time-reporting rules. Dudley also teaches, runs an NIH-funded clinical trial at nearby Emory University, and sees patients at the VA medical center, where he's chief of cardiology.

Adhering to the rules for his lab research is "extra-special complicated," Dudley explains, citing complementary grants from different funders involving heart rhythm problems in pigs. "One title is 'Superoxide and the Pathogenesis of Atrial Fibrillation,' and the other is 'Nitric Oxide and the Pathogenesis of Atrial Fibrillation,'" he says. Then there's the problem of accounting for what he actually does, such as a recent project on how oxidative stress influences membrane proteins that go awry in atrial fibrillation. "It wasn't in the aims of either [grant]," he says, but "it's related to both."

Dudley faces a similar problem when purchasing equipment for pig surgery. "If I buy a piece of equipment to operate on a pig and I've got two pig grants, what do I do" about assigning the equipment's cost, he asks. "The fairest way would be to split it down the middle," he admits. But that choice means extra paperwork. Dudley prefers to assign each piece of equipment to a particular grant. "Sometimes filling the commitments of these grants requires a flexibility that is not built into the system," he says.

Others are more blunt. "The so-called time spent on a grant is an elaborate fiction," says Steven Block, a biophysicist at Stanford University in California. "What's relevant is whether I do the work."

Stumbling blocks

But for auditors, a scientist's productivity isn't what matters. One of the most common problems in a federal audit, say Kenney and Constance Atwell, a consultant to NIH and other government agencies, is a university's failure to properly document faculty time and effort. The forms might not be signed, or submitted, or they might be completed by an individual "who didn't know what the effort actually was," says Kenney. "Compliance officer

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—Steven Block, Stanford University

positions are probably the biggest growth industry in terms of administrative positions at major research universities," says Tony DeCraepeo, president of the Council on Governmental Relations in Washington, D.C., which helps schools address compliance issues. Most schools, he says, "are in the process of reassessing their compliance structures."

Two common stumbling blocks are trying to separate time spent on patient care from that spent on a clinical trial and assigning to existing federal grants effort devoted to gathering preliminary data for an unfunded project. This so-called piggybacking or bootlegging is "a time-honored practice. ... Anyone who says they don't [do this], I would say, is a liar," says Block.

Although some rules are bent because researchers feel they have no choice, other violations appear to be unintentional. One frequent misstep is in the denominator used to calculate time and effort. Many scientists mistakenly

believe that NIH, which funds the majority of U.S. scientific research, bases its measurements on a 40-hour workweek. That assumption "is not correct," says Kenney, and making it can get universities into trouble. Notes UAB's Anderson, "I don't know how many times I've had people say, 'I'll just go home and work on my grant, and that way it won't count.'" All effort matters, he emphasizes, and needs to be counted in the equation.

Scientists and university administrators would like the government to focus on the accomplishments of a research project rather than the percentage of a researcher's time devoted to it. "Time is sort of false," says Nancy Wray, director of the office of sponsored projects at Dartmouth College in Hanover, New Hampshire. Dartmouth is currently fighting an accusation from HHS that it overbilled NIH \$36,268 on a diagnostic radiology grant.

Although Wray and others wish to de-emphasize time, the government seems to be heading in the opposite direction. The November HHS guidance appears to stress "timekeeping" more heavily than does A-21, the existing regulation. Although the guidance would be voluntary, universities are dubious that auditors will see it that way. "Either there are rules or there aren't rules," says Pierre Hohenberg, senior vice provost for research at New York University, which is reviewing its time and effort reporting procedures. "The government getting into the business of just being helpful ... is easily misinterpreted."

All of this debate doesn't solve Guay-Woodford's dilemma about how to assemble her kidney grant proposal. So she's planning to do it in the evenings and on weekends. "That is, I think, in keeping with the spirit of the guidelines," she says. "I'm not spending 3 weeks doing nothing else. ... But it's not absolutely [sticking] to the letter."

—JENNIFER COUZIN

NEWS

Researchers criticized for poor time-keeping

With billions of dollars flowing into US universities, monitoring how researchers spend their time is itself almost a science. Today's active researcher, who teaches, consults and works far beyond a 40-hour week, can be a hard animal to track.

Now, the US National Science Foundation, based in Arlington, Virginia, has launched the most comprehensive inquiry yet into how researchers account for their time on government grants. Concerned about how universities oversee scientists' hours, the agency's Office of Inspector General is in the first phase of a nationwide audit of 30 major universities.

Every year, about one-third of award funds from the National Science Foundation goes to salary and wages, for a total of around US\$1.3 billion. "This audit is designed to get the big picture to see where the money goes," says Tim Cross, the foundation's deputy inspector general. "Record-keeping has been found to be good to sloppy to non-existent."

So far, two such audits have been published, for the University of Pennsylvania in Philadelphia and the California Institute of Technology (Caltech) in Pasadena. Both show deficiencies in how researchers report the use of their time and in how their institutions monitor them.

Time is money

The auditors aren't looking to recover funds, Cross says — just making sure that universities follow the rules. Such audits can result in less money going to the institutions. For instance, cutting Caltech's indirect costs by just 0.5% saves \$600,000.

Results from these first audits led the Office of Inspector General to direct private accounting firms to look into the next batch: the University of California in San Diego, the University of California in Berkeley, the University of Utah in Salt Lake City, the University of Illinois at Urbana-Champaign and Vanderbilt University in Nashville, Tennessee. All remain closed-mouth about the process. Utah and Illi-

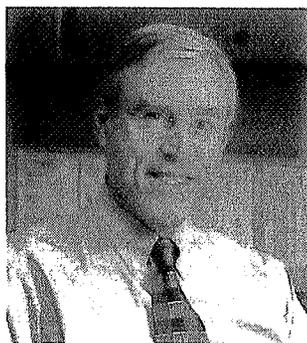
nois say that they have received draft audits for comment, which they declined to release. Draft audits for other universities are expected in the coming weeks.

The Office of Inspector General has also notified another group of universities to expect visits in the coming months. Agency officials declined to name the universities until the documentation has been finalized.

National Science Foundation officials decided to undertake the probes after several federal lawsuits involving projects funded by the much larger US National Institutes of Health (NIH) in Bethesda, Maryland. In two demonstrative cases, whistleblowers claimed that Northwestern University in Evanston, Illinois, and Johns Hopkins University in Baltimore, Maryland, failed to properly specify to the NIH how much time researchers had devoted to their grants.

Payback

Northwestern repaid \$5.5 million in 2003, and Johns Hopkins \$2.6 million in 2004, to settle the false-claims cases without acknowledging wrongdoing. The universities say that the cases were due to lapses in book-keeping. However, Robin Page West, the Baltimore-based attorney on the false-claims lawsuit against Johns Hopkins, notes that time-reporting violations can be complicated; in at least one case auditors had initially missed violations, she says.

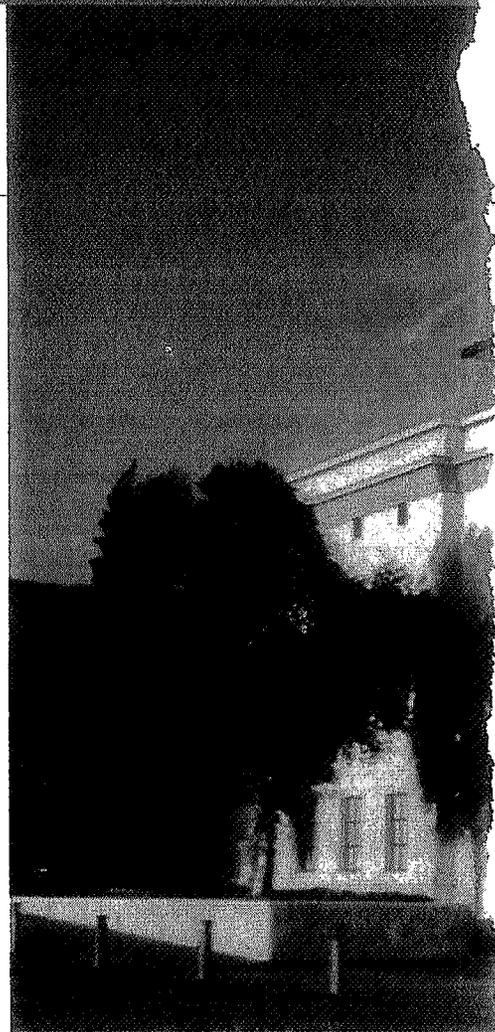


"Record-keeping has been found to be good to sloppy to non-existent."

— Tim Cross

of dollars of programmes, the agency says it doesn't worry much about picking through an NIH's researcher's time. "We have to be pretty judicious expending our resources," says Jon Crowder, who directs the NIH inspector general's grant oversight division.

At least one institution — Harvard Medical School in Boston, Massachusetts — has



self-reported such a violation under NIH grants. In 2004, Harvard agreed to return \$3.3 million after a researcher at an affiliated hospital improperly reported and used training funds for research.

Deep-seated

In the halls of US academia, stories abound of brilliant researchers whose time-reporting for their several big grants would add up to well over 100% of their time. Research misconduct cases have also hinted at misreporting. In one case, a scientist found to have faked data had NIH research grants with time commitments totalling much more than 100%.

In one of the few studies on reporting practices, a Minnesota sociologist has found much potential for irregularities in reporting. In a survey of nearly 1,800 NIH grantees (see *Nature* 435, 737–738; 2005), Brian Martinson of the HealthPartners Research Foundation in Minneapolis found entrenched violations among early- and mid-career scientists.

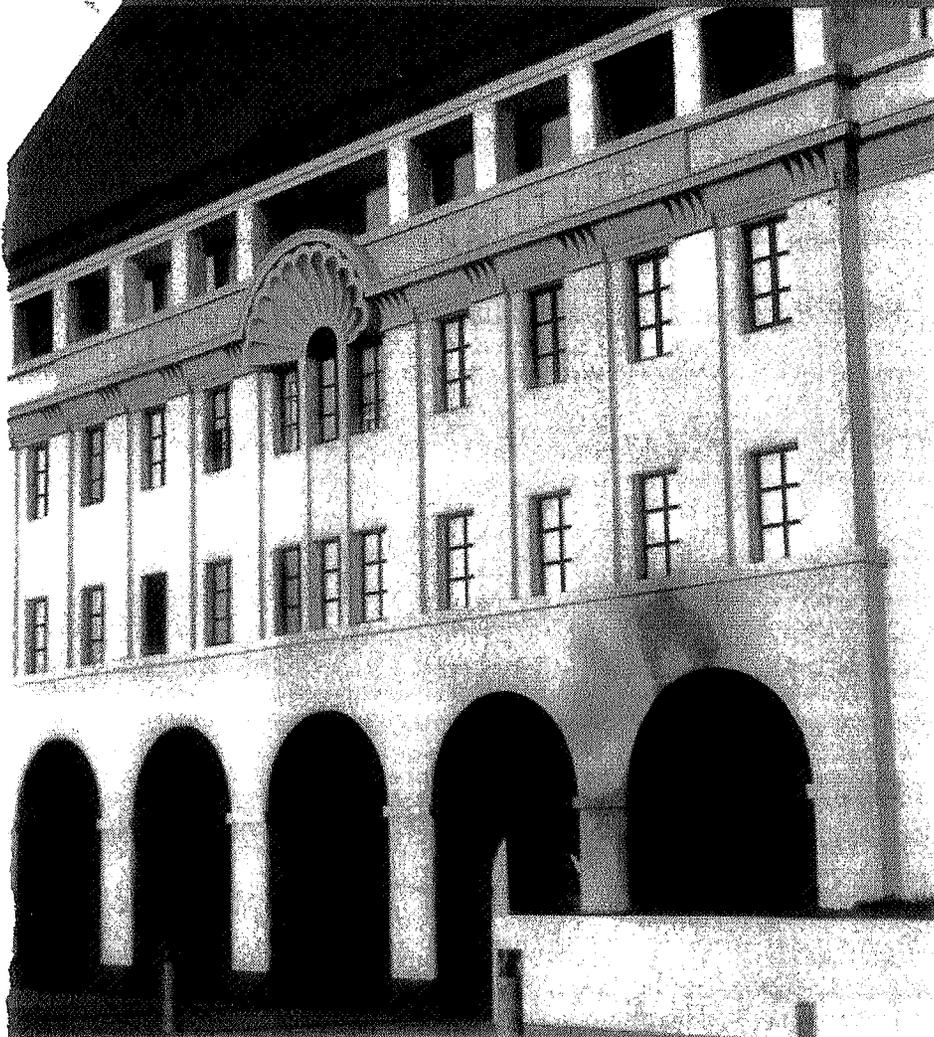
For mid-career researchers winning their first RO1 grant, 70% said that they had used funds awarded for one project for other projects within the previous three years. For postdoctoral researchers, 30% acknowledged this practice. "This indicates this is the norm nationally," says Martinson. "This is

NSF



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ALAMY



Caltech is one of the first universities to be audited by the National Science Foundation.

something the NIH may not want to know very much about."

For the National Science Foundation, the role of aggressive watchdog is new. In its first scrutiny, at Pennsylvania, auditors determined that the university couldn't show that at least \$9.2 million, or 37%, of the salaries billed to the foundation between 2002 and 2004 hadn't actually benefited other activities instead. "The systemic nature of this control weakness raises concerns about the reasonableness and allowability of the labor effort charges on [Pennsylvania's] other \$525 million of federal awards," auditors concluded. Officials at the university say that new control systems have been put in place to address the audit's findings.

In addition, in 23 of the 65 effort reports audited, managers had approved the reports without verifying that the work took as long as claimed. And 24 of the reports were filed late.

The university didn't hold department chairs responsible for the deficiencies. Who should be held responsible "is a big issue," says Theresa Ashman, controller at the University of Utah. Similar concerns have arisen, she says, in the ongoing audit at Utah, which received \$21.4 million from the foundation last year.

At Caltech, grant applications showed that researchers weren't disclosing the amount of time to be spent on current and planned projects, as required by the National Science Foundation. In particular, four of five faculty members studied did not include time for the work they were proposing to do in 10 of their 11 proposals. Furthermore, some of the researchers who had committed to spending up to 20% of their time on a foundation grant failed to report this to Caltech's payroll system, which had a ripple effect of inflating the university's reimbursement rate for indirect costs. And every report checked was filed later than the 150 days allowed by Caltech policies.

Action points

Sharon Patterson, the associate vice-president for finance at Caltech, declined to speak about the specific details of the audit. Through Caltech spokeswoman Jill Perry, she stated that the university had issued a formal response to the audit at the time, which noted that Caltech's grant-management programme was sound, and that it is improving the tracking of faculty members' time-reporting.

Among the examples in the audit was that of physicist Robert McKeown, a lead

researcher at Caltech's Kellogg Radiation Laboratory. McKeown's 33-person lab has received \$11.9 million in grants from the Department of Energy and \$3.8 million from the National Science Foundation to, among other things, develop the California High School Cosmic Ray Observatory for research and education.

According to auditors, McKeown explained that he had spent half his time on the project for the science foundation, and half on the studies for the Department of Energy. But auditors said that Caltech records could confirm only that he spent 17% of his time on research funded by the National Science

Foundation. They found no records to support his time spent on the projects for the Department of Energy, on which he had pledged to spend 20% of his time. He also left blank on a proposal submission to the foundation the time that he proposed to spend on various projects. McKeown did not respond to *Nature's* requests for comment.

"This is something the NIH may not want to know very much about."

Speed bumps

Another Caltech researcher cited for time-reporting issues is Steven Low, a computer engineer whose NetLab has led projects that have repeatedly set supercomputer speed records. Auditors say that Low told them he spent half his time on five grants from the National Science Foundation, 20% on Army and Air Force awards, and 30% on teaching and administration. But auditors found Caltech records indicating only that he spent 18% of his time on three of the foundation grants. Caltech had no records for time spent on the Air Force proposal, the Army award and the other two foundation grants. The auditors also found that none of the five grants disclosed the researcher's pledged time commitment. According to Perry, Low was too busy to comment.

Although such deficiencies could be construed as just bad paperwork, the National Science Foundation is worried that the grant-award process is being undermined. Future grant reviewers are likely to keep a sharper eye on the work commitment proposed by applicants, says Joyce Werking, an audit manager at the Office of Inspector General. "This has been below the radar," she says. "Review panels don't get into it."

Granting panels and programme managers probably will from now on.

Rex Dalton

See Editorial, page 508.

On the paper trail

The National Science Foundation's efforts to audit time-keeping could serve a useful purpose.

Gripping about the paperwork involved in grant proposals is a popular pastime in academia. And there will doubtless be plenty more complaints in the United States as the National Science Foundation (NSF) launches an audit of how accurately researchers at 30 universities report the time spent on their research projects — a practice known as 'effort reporting' (see page 512).

US scientists already do plenty of bookkeeping on their federal grants, and the NSF's more rigorous requirements for them to account for their time are unlikely to be well received. Science, after all, thrives on researchers being free to explore fresh avenues of discovery without being hampered by too much bureaucracy. A careful balance must be struck between agencies and the scientists to whom they provide grant money, based on a degree of trust that funds will be used honestly and for the purposes described in the grant application.

Yet the NSF, with a budget of \$6 billion, is now a major agency with a responsibility to the public to account for how that money is spent. So scientists should cooperate generously with the new audits, even if they cannot learn to love them.

Relatively little is known about how researchers spend their time using grant money. The NSF is trying to ensure that universities are supervising their researchers sufficiently and are thus avoiding flagrant abuse of the funding system. Two initial audits have uncovered sloppy record-keeping that could hint at a bigger problem. Auditors have found, for instance, that researchers say they expect to devote a certain percentage of their time on a particular grant-funded project, but then fail to keep track of the hours they actually do spend on it.

The NSF hasn't decided to conduct the audits arbitrarily. Whistle-

blowers at two universities highlighted cases in which researchers failed to tell the National Institutes of Health (NIH) about the amount of time they spent on projects it had funded. The universities involved subsequently repaid the money.

In the coming weeks, the NSF will finalize and release audits of five more major universities: these may bring to light further problems in the time-reporting system. As scientists complain about tight budgets and more competition for award money, they should support efforts to make sure that money is tracked accurately.

Faced with the paperwork involved in each grant application, and unsure of the details of how each project will actually pan out, researchers are often inclined to leave blank the line that requests an estimate of how much time they will spend on the project. But they should make every effort to provide this figure. It could, for instance, cut down on the number of unfortunate instances in which researchers over-commit to various proposals, and then fail to spend enough time on any of them.

Eliminating this kind of overload should also help ensure that graduate students and postdocs get adequate guidance from their supervisors.

According to NSF auditors, grant reviewers are likely to start paying more attention to effort reporting on applications within the next few grant cycles. This would be a welcome development. Congress should give the NSF inspector-general's office the money it says it needs to hire more auditors. The NSF should not, of course, go overboard in persecuting competent researchers for minor violations of bureaucratic standards. But it should try to raise the level of compliance in effort reporting.

These NSF efforts may, in time, serve as an instructive template for the NIH, a far larger agency that has done little as yet to monitor its grantees' effort reporting. With so much money at stake, a little extra paperwork is not necessarily a bad idea. ■

"Scientists should support efforts to make sure that money is tracked accurately."

Living with the heat

Science and politics need to engage more than ever.

Whether face-to-face with a president or prime minister, or participating in public consultations, scientists interacting with politics must cope with two major challenges. They are likely to encounter a degree of unfamiliarity with science and the way it works that requires all their skills to convey crisply what they know in a way best attuned to their listeners. At the same time they will soon realize that those with whom they are engaging are not only in the driving seat but often have constraints, values and goals that the scientists need to understand and, where appropriate, to which they must adapt.

Throughout history, individual scientists have found themselves in direct dialogue with politicians, and have encountered the full range of acceptance, hostility, knowledge deficits, political judgement and dilemmas. Some find themselves in discussion with other stakeholders in assessing policy issues. The recent UK nanotechnology dialogues

(see *Nature* 448, 1–2; 2007) illustrated the virtues of engagement in a number of local contexts. They also showed how much both scientists and others can learn from such engagements, whether about the realities of African villages, public values or what science itself may be able to contribute.

Whether in planning future agriculture (see page 518) or in responding to potential disasters, scientists find themselves increasingly involved in political processes. This is as it should be. And not all scientists are 'natural'. Social scientists can also bring a great deal to the table, in analysing people's attitudes and behaviours.

Nature will fully explore these sorts of engagements in a series of essays, 'Science and politics', launched this week by Richard Garwin (see page 543). His account of the decline in mechanisms for providing the US government with scientific advice is pessimistic, if all too timely. More upbeat is next week's dispatch from Hans Wigzell about the changes he wrought to stem-cell policy-making in Sweden by enthusing ministers about research. And we promise that the series will end with a sense of confident affirmation of the virtues of rationality. Mindful of President Harry S. Truman's advice, scientists need to stay in the kitchen, recognizing how hot it can get. ■



Time: research necessities make it hard to keep track

SIR — Plans to impose effort-reporting on scientists, as mentioned in your Editorial 'On the paper trail' and News story 'Researchers criticized for poor time-keeping' (*Nature* 449, 508 and 512–513; 2007), will be difficult to implement. In practice, it is almost impossible to give an accurate estimate of effort, because scientists are rarely off the job, even when asleep. If they are not actually doing a particular task, they are planning the next, or puzzling over the most recent observation. How should that time be counted? In most research, the edges of a project are only known indistinctly. So in many cases it is difficult to know when one has wandered from one project to another or into an unfunded area.

The definition of '100% effort' causes another problem. This metric tends to be based on a 40-hour week, but not many funded scientists can afford to do so little work — 80 hours (200% effort?) is more common. Also, in these days of tight budgets, how should the project director account for the time spent on writing and revising new grant applications? Under the current funding system, a very large fraction of time is spent on this activity.

Finally, it must be recognized that bootstrapping a new project with the funds of an existing project is built into the system. If there is no venture capital available, new grants have to be built on the backs of existing ones. After all, that's how they got funded in the first place. When was the last time a new proposal was funded in the absence of any preliminary data?

There may be some abuse in very large labs with multiple sources of funding. Filling in the blanks on applications and enforcing appropriate effort reports should be the norm. But please don't reduce the time available for research still further by making researchers account for every moment.

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Time: accounting problems caused by Caltech system

SIR — You report on a National Science Foundation (NSF) audit of Caltech's accounting system in your News story 'Researchers criticized for poor time-keeping' (*Nature* 449, 512–513; 2007). The audit cited accounting deficiencies, in particular the handling of professorial effort as "voluntary committed cost sharing" as opposed to "voluntary uncommitted cost sharing".

Although faculty and staff were following the Caltech accounting practices that were in place at the time, your News story states that researchers "failed to report this to Caltech's payroll system". In fact, we did not have that option because of the deficiencies in the system. The audit report did state that "Caltech's responses, once implemented, should address our audit recommendations".

Although the NSF report discusses interviews and facts related to several principal investigators and their grants, it does not name individuals. Even though the report does not refer to me by name, your News story associates information in the report with me personally. The NSF auditor, Joyce Werking, incorrectly recorded my statements about my time allocation in the report. The statements about me in your article are erroneous, taken out of context and unfair to me. Although *Nature* did attempt to contact me during the week before going to press, I was away at the time and unable to respond.

Certainly, Caltech and other universities should increase their efforts to align their accounting practices with agency regulations. Also, NSF should improve its methods for gathering and accurately reporting information. And *Nature* could have presented a more informed, responsible and balanced view.

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