Where Politics, Policy, Technology and Science Converge

From the White House to Berkeley, Thomas Kalil has worked on shaping the national agenda for science and technology research initiatives.

Thomas Kalil, President Clinton's former science and technology advisor, now holds a similar post at the University of California, Berkeley, where he helps develop new research initiatives and increase UC Berkeley's role in shaping the national agenda.

UBIQUITY: What was it like working in the White House?

THOMAS KALIL: It was an incredibly rewarding and exciting job -- and a real privilege to serve under President Clinton and Vice President Gore. The White House is a very flat organization. I reported to someone who reported to the President of the United States. I worked for a part of the White House (the National Economic Council) that had the ear of the President -- thanks to the three people who served as head of the NEC -- Bob Rubin, Laura Tyson and Gene Sperling. If I had a good idea in the fall and worked hard, there was a decent chance that I could get it in to the State of the Union in January and the federal budget in February. It's also interesting because you wind up learning how to do a little bit of everything -- policy analysis, speech writing, working with the Congress, briefing the press, international negotiations, and mediating disputes between federal agencies. I also got the opportunity to meet with a really diverse range of business leaders, university researchers, and heads of non-profits and foundations. It was also pretty exhausting. We worked until 9 or 10 most nights, sometimes later. You couldn't ask the President for an extension -- you needed to stay until whatever you were working

on was done. The gallows humor at the White House was "Friday means only two more working days until Monday."

UBIQUITY: When you were working for the White House, you were the point person on the National Nanotechnology Initiative, the Next Generation Internet, and efforts to expand funding for the physical sciences and engineering. Looking back, what do you feel were your most effective contributions?

KALIL: I had the privilege of working at the White House for eight years, so I had the opportunity to work on a huge range of issues. For example, I pushed for the liberalization of Cold War export controls on computers, which freed up $30 billion in exports, and fought for the allocation of wireless spectrum for unlicensed services in the 5 GHz band in 1996. I was very involved in our efforts to expand access to educational technology and to bridge the digital divide. I was also the principal White House advocate for the National Nanotechnology Initiative, and an initiative to increase funding for long-term information technology R&D. The IT initiative led to: the ITR program at NSF; a big boost in the CISE budget at NSF; and new DARPA programs in pervasive computing, the convergence of "bio-info-nano", and computing "beyond CMOS." The NNI is certainly one of the more successful things that I worked on. It enjoys strong bipartisan support, and we're seeing exciting results every week emerge from the research community. Although there is always a danger that nanotechnology will be over-hyped, I think the potential long-term economic and social impacts are on par with electricity, the integrated circuit, and the Internet.

UBIQUITY: And of course the next question must be: in what ways were you disappointed with the results of your efforts, and how would you account for what happened?

KALIL: If I had to do everything over again, knowing what I know now, I certainly would have gotten more involved in intellectual property issues. For example, I think the Copyright Term Extension Act was bad legislation, and is undermining the development of a robust public domain. I did get involved in the debate on database legislation, and helped convince Congress not to pass what the education and research community thought was an unbalanced proposal.

UBIQUITY: Without getting into politics as such, what have you learned about the interplay between politics, policy, technology, and science?

KALIL: That's a pretty broad question! Here are a few of the things that I learned during my eight years at the White House. First, very few politicians have a technical background, and scientists and engineers generally do a bad job of explaining the importance of their research. With the exception of MIT's Chuck Vest -- few university presidents bothered to establish long-term relationships with White House staff. Second, politicians are generally focused on short-term issues, and the payoffs from research may not materialize for decades. Third, science and technology issues are not inherently partisan. For example, one of the biggest supporters of Clinton's National Nanotechnology Initiative was former Speaker Newt Gingrich. Finally, there is a reservoir of interest and enthusiasm about science and technology in our political system that we don't always take advantage of. Americans are fundamentally optimistic about the future, and talking about science and technology allows politicians to tap in to that

optimism. What's needed are "civic" scientists, engineers, and high-tech leaders who are willing to help establish a forward-looking, public policy agenda.

UBIQUITY: Tell us about your role now at Berkeley. Where do you fit in organizationally, and what do you hope to accomplish?

KALIL: I'm the Special Assistant to the Chancellor for Science and Technology. I help the campus develop new research and education initiatives that cut across multiple departments and colleges. For example, I am strengthening the campus activities in nanoscale science and engineering. We have more than 80 faculty in biology, chemistry, engineering and physics with active research programs in nanoscience and nanoengineering. I'm helping the campus develop and implement a strategy that includes recruiting additional faculty, developing new courses at the undergraduate and graduate level, expanding our shared facilities for nanoscale imaging and fabrication, and creating multidisciplinary "centers of excellence." Berkeley can make a unique contribution to this area because of the quality of our faculty and students, our proximity to the Lawrence Berkeley Lab, which is building the $85 million "Molecular Foundry," and our participation in the Bay Area innovation ecosystem. Faculty research at Berkeley is moving rapidly from the lab to the marketplace -- and is being commercialized by start-ups such as Quantum Dot, Nanomix, and Nanosys.

UBIQUITY: What's your view of the balance of science and technology funding by the federal government? What are the obstacles to establishing and keeping a proper balance?

KALIL: Obviously, there is a huge imbalance between biomedical research and the physical sciences and engineering. There was a well-orchestrated and successful

campaign to double the NIH budget, while support for most areas of the physical sciences and engineering has been flat or down. This is a problem for two reasons. First, health research is increasingly dependent on advances in the physical sciences and engineering -- such as imaging, bio-informatics, and combinatorial chemistry. Second, these disciplines are important in their own right, and certainly serve as the foundation for much of our "high-tech" economy. In addition to this imbalance between disciplines, there are also huge disparities in the extent to which R&D is used to support different national objectives. R&D plays a big role in defense, space exploration and health. It plays almost no role in education, for example. We invest less that 0.1 percent of K-12 expenditures in R&D. As a result, we are not investing in rigorous assessments of what educational reforms actually improve student performance, or in the creation of next-generation learning environments that allow students to engage in "learning by doing." There are a number of obstacles to creating a balanced research portfolio. The first is that that fixing it will cost money, and we now have $500 billion deficits, so it is difficult to make the case for increased investments in today's environment. The second is that politicians understand why spending money to combat cancer, AIDS and Alzheimer's is a good idea. They have less of an appreciation for why investing in materials science, condensed matter physics, and computer science is so critical. Finally, the coalition in favor of doubling the NIH budget (patient groups, universities, industry) was well-funded and well-organized. There is no comparable coalition pushing the physical sciences and engineering.

UBIQUITY: Provide an overview description of a few of the projects in which you are currently most involved.

KALIL: I'm heavily involved in the Center for Information Technology Research in the Interest of Society (CITRIS). As the name suggests, CITRIS is not only developing next-generation information technologies, it is also demonstrating how they can be used to improve our quality of life. For example, I am working closely with a group of faculty headed by Eric Brewer, which has NSF funding to explore information and communications technologies for the developing world. It's an interdisciplinary team that includes electrical engineers, computer scientists and social scientists. The goal of the project is to create information and communications technologies that are more useful and affordable for the 4 billion people on the planet who earn less than $2,000/year. Devices might need to be much cheaper, lower power, easy to maintain and usable by populations with multiple languages and low levels of literacy. We are working with a great set of partners, including HP's lab in India, the United Nations Development Program, Intel, Microsoft and several of the India Institutes for Technology. In addition, Richard Newton, Eric Brewer and I are teaching a course with CMU on IT for developing countries.

UBIQUITY: This week, a U.N. summit on the Information Society estimated that it will take more than $6 billion to extend phones and the Internet to all corners of the world. Do you think, first, that that figure is about the right order of magnitude, and, second, that there's a realistic possibility of coming up with the funding?

KALIL: Developed countries are not likely to come up with billions of dollars of subsidies to connect the developing world. I believe that the more important goal is to

discover which business models are capable of "serving the poor profitably" as Al Hammond and C.K. Prahaland put it. [See http://www.digitaldividend.org/pdf/serving_profitably.pdf.] Approaches to developing country connectivity that rely heavily on public subsidies won't scale, and they won't be financially sustainable. Having said that, I do think there are steps that developed countries should be taking to bootstrap the process -- such as support for R&D, pilot projects that explore different applications of IT, and expansion of the developing country workforce with IT skills.

UBIQUITY: Tell us about your background. Where did you go to school, what did you study, and what were you doing before you joined the Clinton Administration?

KALIL: I went to the University of Wisconsin-Madison for my B.A., and then did some graduate work in international political economy at the Fletcher School of Law and Diplomacy. I worked on two Democratic presidential campaigns -- in 1988 and 1992. Both times I worked in the Issues Department, which means writing position papers, briefing the candidate on every policy issue under the sun, and getting the candidate ready for debates. It's like boot camp for policy wonks! After the 1988 campaign, I got a job representing the Semiconductor Industry Association in Washington, and had the good fortune to staff Gordon Moore in his role as the Chair of the SIA Technology Policy Committee. I worked on trade and technology policy issues like funding for SEMATECH, access to the Japanese semiconductor market, and the development of the first semiconductor technology roadmap.

UBIQUITY: You commented earlier that very few politicians have a technical background, and scientists and engineers generally do a bad job of explaining the

importance of their research. Whose fault is that? Are the institutions of higher education doing something wrong? If so, how could they correct it?

KALIL: I don't think that this has been a huge priority for universities or for companies that depend on university research for new ideas and a high-tech workforce. I don't think that there is any silver bullet here, but fixing it would require a real commitment at the university president/CEO level. Also, the research community can often be skeptical or even hostile towards scientists that spend too much of their time communicating with the public.

UBIQUITY: Let's appoint you president of a major university. There, it's done! What will you do first (and second, and third) to right this situation?

KALIL: Thanks for the promotion! The first thing that I would do is to work with my colleagues to define some important national and global goals that can be met in part by increased investment in research and development. These "grand challenges" would be accompanied by a research agenda (and national investment strategy) needed to achieve these goals. Some examples might include:

-- Develop energy technologies that are carbon-free, competitive with fossil fuels, and can scale to a terawatt or more

-- Create new learning technologies that approach the effectiveness of a one-on-one tutor and are fun to use

-- Develop an effective defense against future threats from genetically-engineered pathogens

-- Allow senior citizens to live independently for an additional 5 years

-- Increase by 50 percent the number of U.S. citizens that pursue undergraduate and graduate degrees in the natural sciences and engineering

The second thing I would do is to convince industry leaders to fund a well-organized lobbying campaign for significant increases in federal investment in long-term research -- driven in part by some of these grand challenges. (Some of the increases need to support curiosity-driven research and a general increase in grant size and duration). The third thing I would do is encourage interested faculty to spend more time talking about the importance of their research with the public, the media, non-profits and elected officials. I might do this by establishing some money for travel, hiring some staffers whose job it is to arrange for these kinds of opportunities, and allowing this kind of public engagement to count as "service" for purposes of tenure and promotion.

UBIQUITY: Okay, we'll forego the usual trial period. The job is yours.

[THE END]

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