It’s a Bumpy Ride to Private Management for Los Alamos, Livemore

By Michael Lucchella and Alaina G. Levine

When the management of the historic Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL) was transferred from the University of California to two private companies, many officials hailed the move as the turning over of a new leaf for the labs. The goal of the transfer was to introduce private sector accountability into a management system seen by many in Congress and the Department of Energy as broken. However four years on, costs have swelled, red tape endures, and questions persist as to whether the transfer has benefitted the labs in the long run.

“When I heard a company was going to run (LANL), I thought they would do it efficiently. I thought it would be good for us,” said a long-time member of the technical staff of LANL. “But it used to be that science drove this place and everyone knew it... Now that’s gone.”

Interviews with current and former employees of both laboratories show shared concerns that since the facilities have become managed by a for-profit entity, science is no longer the top priority; rather, the emphasis is on generating profits through a climate of intense risk aversion. Many of those who still work with the lab have asked to remain anonymous because of concerns of repercussions from their employers.

One of the lab’s former directors said that the system of governance at LANL in particular was broken in 1997 and since then has become more so. Siegfried S. Hecker served as the Director of LANL from 1986 to 1997 and is currently a research professor in the Department of Management Science and Engineering, and the co-director of the Center for International Security and Cooperation at Stanford University. He said the excessive security concerns, the creation of an extra level of bureaucracy, and the belief that they are sandwiched between extremes and let them battle it out for large increases in the number of scientists transferring from their programs, as well as strong departmental and institutional support for teacher preparation efforts. The review panel evaluated based on their capacity for large increases in the number of physics teachers graduating from their programs, as well as strong departmental and institutional support for teacher preparation efforts.
"A strong form of randomness may not be a useful de-vice independent. It doesn’t matter what’s inside the box."

Christopher Monroe, University of California, University Public Radio Public, April 14, 2010.

“Humans have fought each other for millennia over tiny differences in race, religion or image…Imagine how many people would react to being stared at from time to time by a character to which one’s personal message to E. T. is to ‘keep well clear and defend yourself,’ before stepping into the hornets’ nest of our militaristic society.”


“A message from an estranged civilization could have an agenda behind it…This agenda might not necessarily be positive. Indeed, it might be very negative.”


“It’s highly unusual for an experiment to be rededicated this close to launch. I would question the wisdom of flying something so redesigned so soon after the delay of the Alpha Magnetic Spectrometer in 2006.”

Gregory Feruc, University of Michigan, on the delay of the Alpha Magnetic Spectrometer, originally slated to be launched into space on board the shuttle Endeavour in late July, New York Times, April 29, 2010.

“Makes me cringe…The terrible dumb blond are steps backwards for stereotyping of the nerd plus the nerdess.”


“Far from being a dumb blonde, Agnesi overcame the unique and intriguing obstacles.”

Steven Chu, Harvard University, as quoted from his paper “Starry Messages for Signatures: Interstellar Archaeology,” Christian Science Monitor, April 26, 2010.
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... or basically the same size, and do a problem, but we don’t know exactly how big the problem is, but nonetheless it’s potentially so big that we better start doing something about it now. Now I stick my neck out in this book because when I talk about either technical solutions or policy solutions, I grade them as “winners,” “losers,” and maybe,” and I am quite sure that some of those things that I list will not be voted on for three centuries and some that I list as winners will excite some criticism, whether it’s on the policy side or the technical side.

At the end of the book, you go into some of the solutions that you see as “winners” and you say that you are “dumb.” What is an example of that? What are solutions that you see as smart and solutions that you see as not so smart?

Here’s an example of one that California has done that I think is a loser. They have put in something called a “low carbon fuel standard.” What does that mean? By 2020, for the same amount of energy output, fuel has to put out 10 percent less greenhouse gases. That sounds good, except that if you think about a car, it isn’t just the fuel that determines what the fuel emissions are, it’s what comes out of the tailpipe. So if I (as the EPA has done) say “OK, we’re going to require 10 miles per gallon by 2016,” that reduces emission by 40 percent, and a lot faster too. If I switch to a diesel engine for the same energy airline, diesel engines are more efficient than gasoline engines. So with today’s diesel engines and today’s diesel fuel I already do about fifteen percent better than gasoline, so why should you add this complexity to something when you’re trying to do is reduce emissions and why do you think you’re so smart as to tell the public how they should do it, rather than tell them what they should do? I am perfectly in agreement with the notion that we should all get together and do this. And in fact if you look at the energy efficiency study that the APS put out, for which I chaired the study group, we said that it’s perfectly reasonable to demand fifty miles per gallon for single fuel vehicles by 2025 or 2030. So I don’t like regulations that specify how, I like regulations that specify what. I don’t think we’re smart enough to know how technology is going to evolve over a long time.

Another example which I think is very disturbing is ethanol. Everybody knows that corn ethanol, which you account for land use changes, averaged over the US is worse than gasoline for emissions. Why are we mandating corn ethanol? You know people say this is a natural solution. If you’re voting it, both parties are looking for votes in the corn belt. As soon as one party made a slight step in that direction the other party had to go along with it, so we’re spending huge amounts of money for nothing. Those are two quick examples, there’s a lot more.

What’s one you see as a good potential solution?

I think the best things for now are substituting natural gas for coal where you could make a huge impact very quickly and you won’t get any credit for doing that in the present system. You get more for petting the solar cells, but solar cells produce electricity for a huge amount of expense. Electricity from solar cells is 25 cents per kilowatt hour compared to five or six cents for a gas-fired power plant. So why are we doing that? Eventually solar cells will be terrible and we’ll have the energy storage that goes with them to make them practical. I’m all for solar cells but I also do for things that can have a big impact at minimum cost. Energy efficiency is another such thing. My pets energy efficiency about substituting natural gas for coal, nuclear power which will certainly be controversial, and getting renewables on board. While we figure out how to face the care of the variability of wind. Right now you can’t really handle that well.

What is the hardest thing about convincing the public and policy makers about how important an issue this is?

The problem is that the consequences are far in the future but you’re asking for people now to not be going to see any effect, I’m an old guy, I’m retired, but my little grandchildren, aged five and a half and three, they’re going to see a big effect. So the effects are downstream and you’re asking people to spend money now and if you look at the science, there are considerable uncertainties in it. It’s going to take time to reduce those uncertainties. If you look at the IPCC fourth report, their scenario is called A1FI, but it’s pretty close to what people would call business as usual. That is, we continue on the present track with all these renewable things, but we get a temperature rise of between, if I remember right, something between two and six degrees Fahrenheit. That’s a big year. The thing is, at how long it’s going to be sorrow that range up, I believe it’s going to be in the next century. And we don’t have a clue why in one of the chapters, why it’s going to take us that long to know whether we’re heading for the low end or the high end. So it’s very easy to say, “well, it’s uncertain, it’s not going to happen for a hundred years, let’s wait.” And unfortunately the longer you wait, the more expensive the hurdle and the harder the problem is to solve.

Would you say you’re pessimistic or optimistic about the future?

No, I’m optimistic about the future. I think that I’ll be dead. I wouldn’t have bothered writing the book. I would have just pulled the covers over my head and ended my life. I think that this so-called Kerry-Graham, Lieberman bill in the Senate that’s working its way through is a much better point than the Waxman-Markey bill that passed the House. It’s more modest in its start, and it takes lessons from other people’s experience, and if it ever gets out of the Senate, I think there’s actually a reasonable chance that it would get enacted.

Any other thoughts? I would just like to end with something that I have already said: Politics is harder than physics, and getting all of this together and into a coherent shape and getting something done is not going to be easy. We shouldn’t expect it to be easy, but sometimes going and above all, we’ve got to get the real story out to the general public in a way they can understand and that’s what I’m trying to do.
Early Work on Graphitic Epitaxial Growth

In the January issue of APS News, Andre Geim stated in a letter that "the earliest paper on graphitic epitaxy is by Carl D. Meade and Z. S. X. Lin and it appears in the "Journal of Vacuum Science and Technology" from 1970." This is not accurate. The earliest paper on graphitic epitaxy is by T. Nakamura and K. Watanabe. The paper was published in the Journal of Crystal Growth in 1971. It is important to note that the Meade and Lin paper was published two years later than Nakamura and Watanabe's paper. This error is likely due to a misunderstanding of the literature or a lack of access to the correct references. It is also possible that the Meade and Lin paper was not widely cited, which could have led to its underrecognition. In any case, the clarification of this error is important for the correct attribution of the work on graphitic epitaxy. The author of the letter is thanked for bringing this error to their attention.
CELL continued from page 4

via the study of polymers. Cell cytoskeletons are made of a polymer unlike anything artificially created in a lab, and they represent one of the most challenging and important problems for the cell biologist. Knowing the mechanisms of cells offers the promise of new physics. Now Levine has taken a different tack. Rather than focusing on cell "call-ques" or tremors in the cell wall that help the cell move around.

"We're in sort of a Lewis and Clark expedition," says Levine, "a time when you can discover mountain ranges and rivers. There's a lot of low hanging fruit."

Higher up the tree, dangling above the heads of researchers who have not specialized in physics, is advertising this new field of biological physics. Levine says, "As you know, the beginning of quantum mechanics, the production of transistor". Together at the APS Meeting, Levine, have cautioned against believing in the better."

Little is known about the effect of mechanical forces on the regulation of cancer cell growth," said Wirtz in the Johns Hopkins press release. "That is what the Engineering in Oncology Center and the National Cancer Institute to find out. The results should point us to therapies and diagnostic tools that complement existing genetic and therapeutic approaches.

Wirtz talks passionately about his interest in understanding the science of cancer, and his hopes that treating cancer through the AP in Portland he emphasized the important role that physicists and engineers will play in reaching that goal.

On the other hand, some of Wirtz's colleagues, including Levine, have cautioned against believing in the magic bullet. "Medicine is the engineering application of physics and biophysics," Levine said. "As you know, there was a long time between the beginning of quantum mechanics and the production of transistor..." can Moore, "We made significant changes...[including] a couple of factual errors that were corrected because of that." POPA submitted the final version of the addendum to the APS Council on April 18, and it was adopted 31 to 2 with one abstention. This won't be the last time the membership is asked to comment on such matters. The Constitution and Bylaws Committee is currently working on a system to similarly solicit input on any future public statements. "It seems like a good process," said councilor Gay Stewart, "Everybody got a chance to voice their concerns.

Not all of the councilors were completely satisfied with the process for members to weigh in. "It should have been quantita- tive not qualitative. It was a very flawed poll," said Austin, who ul- timately drafted the climate change statement. He said that having members submit written re- sponses was an unwise way of engaging the membership, "I think they should have had a professional pollster come in.

All of the councilors interviewed said that an important issue to them was that any statement had to be based on sound science. "It's a good idea to have the caveat that in the end POPA has to write the statement based on their work and not just a poll of the mem- bers," noted councilor Steven Rosen.

Moore to draft an addendum to the RISKY continued from page 3

Food, Drink, and Lasers on the Hill

APR NEWS

May 19, 2010

After each subcommittee member weighed in and provided or opposed the proposed ad- dendum, they went back and re-edited the statement based on the comments from the membership. Over 100 changes were made to 20 pages, and several of the changes were more substantial. "The membership had a huge impact on the final report," said subcommittee chair Donelan.

RISKY continued from page 3

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How DO Lasers Take the Fight Out of Stark Field?

In late April, the APS LaserFest outreach team participated in the Cambridge Science Festival in Cambridge, Massachusetts. The festival is an excellent opportunity to sample a variety of giveaways and demonstrations illustrating some of the unique features of the laser. In the picture, APS Outreach Specialist Chris Dixon (right) is: “It was difficult to get work done in 1997, and now it’s simply so difficult to get work done that it gets difficult to attract the best and brightest to the facility,” he said. “It’s gone downhill for some time and we failed to fix it with the creation of the NNSA and the new management structure.” He added that people are now more afraid to make mistakes, contributing to the difficulty of conducting scientific work.

How things got to be where they are

The University of California managed the operations of Los Alamos and Lawrence Livermore starting their turn in 1982 and 1987 respectively. During the late nineties and early 2000s dissatisfaction with UC's management and security of the labs had been increasing among the scientists and in Congress. In 1999, the Department of Energy accused and jailed Los Alamos physicist Wen Ho Lee, based on 59 counts of improperly handling nuclear secrets, charges that were eventually dropped. Suddenly you have all these lists of requirements instead of when you're a [Federally Funded Research and Development Center]. The former director of Los Alamos thinks that one of the biggest problems is a lack of direction at the lab. Los Alamos and Lawrence Livermore are the nation’s two top weapons labs, but since the end of the cold war, their purposes have become less clearly defined.

“It’s critical for the labs to have their mission redefined and changes made in management to make it easier for jobs to get done,” Hecker said.

Wallace said that while the primary goal of Los Alamos remains “to be the premier national security science laboratory,” its mission is evolving. Emphasis remains on reducing the risk of nuclear terrorism, but there’s a lesser focus on fixing the system. There are more clearly still things that we have to deal with as we go forward,” he said. “There were disruptions and difficulties… but I think we are well on our way.”

LOS ALAMOS continued from page 1

Evaluation reports detail how well the labs did on a list of goals and metrics that determine how much of their possible fee they earned. However starting in 2008, concerns about laboratory management and security of the labs had been increasing among the scientists and in Congress. In 1999, the Department of Energy accused and jailed Los Alamos physicist Wen Ho Lee, based on 59 counts of improperly handling nuclear secrets, charges that were eventually dropped. In 2003, then secretary of energy Spencer Abraham said that there were what he called “systematic management failures,” the management contracts with UC would not be renewed, and the DOE would soon accept bids for new contracts to run the labs.

Only private companies were allowed to bid, and UC joined with the engineering firms Bechtel, Babcock & Wilcox, and URS to form Los Alamos National Securi- ty LLC (LANS). In addition, they aligned with research firm Battelle to form Lawrence Livermore Na- tional Security (LLNS). Though separate companies, the two organi- zations share many of the people on the two boards of governors. LANS took over operations from the University of California in June of 2006, and LLNS took over in October of the following year.

Until 2008, the LLCS issued publicly available reports that de- scribed the performance of each of the labs. These performance evaluation reports detail how well the labs did on a list of goals and metrics that determine how much of their possible fee they earned. However starting in 2008, concerns about laboratory management and security of the labs had been increasing among the scientists and in Congress. In 1999, the Department of Energy accused and jailed Los Alamos physicist Wen Ho Lee, based on 59 counts of improperly handling nuclear secrets, charges that were eventually dropped. In 2003, then secretary of energy Spencer Abraham said that there were what he called “systematic management failures,” the management contracts with UC would not be renewed, and the DOE would soon accept bids for new contracts to run the labs.

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ANNOUNCEMENTS

M. Hildred Blewett Scholarship for women Physicists

This scholarship has been established to enable women to return to physics research careers after having had to interrupt those careers for family reasons. The scholarship consists of an award of up to $45,000. The applicant must currently be a legal resident of the United States or Canada or the US and must have an affiliation with a research-active educational institution or national laboratory. She must have completed work toward a PhD.

Applications are due June 4, 2010. Announcement of the award expected to be made by August 4, 2010.

Details and online application can be found at http://www.aps.org/programs/women scholarship/blewett/index.cfm

Contact: blewett@aps.org

Proposed Constitutional Amendment

The model also predicts that the fermions are in the same or different temperature and whether the two cannot occupy the same state at the same time. As a result, molecular bonds and reformed as one molecular bond.

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Eberhard Klempt and Jean-Marc Richard

APPLIED PHYSICS

Magnetism Near Absolute Zero

Physicists at the March Meet- ing of the American Physical Society (APS) announced the first observation of chemical reactions at tem- peratures near absolute zero. It is the first time that the quantum state of molecules is significantly af- fected by a chemical reaction.

Researchers at the University of Colorado cooled a gas of po- tassium-rubidium molecules in an optical lattice to a few nanokel- vins above absolute zero and ob- served the atoms break and reform molecular bonds.

“What’s going on here is chem- istry,” said Deborah Jin from JILA at the meeting. “It is one of the one of the one of the teams that conducted the experiments,” this is the first time in a chemical reaction the quan- tum state of molecules is affected.

The cooled molecules reacted with each other over distances much more than they normally would, because of these ultra-low energy levels, the quantum wavelength of each molecule expands out to over 100 nanometers, much greater than the 1 nanometer distance over which chemical reactions typically occur.

When the wavelengths of two potassium-rubidium molecules overlapped under the right condi- tions (the right interaction of valence bonds and reformed as one mole- cule of two rubidium atoms and one of two potassium atoms.

“The two molecules are highly reactive when they are close to- gether, with nearly 100 percent probability of reaction when they are within less than 10 nanometers of each other,” said Paul Julienne, a theo- rist at NIST who was also on the team. “The quantum nature of the long quantum wavelengths of the molecules, more than 100 nanometers, means that they can only get within 1 nm of each other by specifically quan- tum waves that depend strongly on temperature and whether the two fermions are in the same or differ- ent spin states.”

This team first developed their model based on technology developed over the last 30 years, and put the parameters that govern postdoctoral researcher Pradeep Alam says they have already be- gun to see the effects of their current model predictions fulfilled.

“All these parameters can now be understood in a global context, so you don’t just start changing one variable without understanding the oth- ers,” said Alam.

The model also predicts that current biosensor technology will reach a wall of sensitivity, limited by the density of disease indicators in a volume, and the amount of time the researchers are willing to wait for the results. The wall can be overcome by new techniques such as amplifying the signal from the disease indicator.

“There really are a huge number of parameters affecting this kind of understanding,” he said.

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Being accused of committing fraud is just about the worst thing that can happen to a working scientist. But what, exactly, does fraud consist of? Fabrication, falsification and plagiarism are the three principal forms of such scientific misconduct. There are various other forms of questionable behavior possible in science, such as sloppy data handling, guest authorship on a paper and so on, but those are much less serious than falsification (frequent flier plan is the mnemonic for the cognoscenti).

Making post-mortem statements about ethics in science is very tricky. There are many plausibly-sounding ethical principles that would wreak havoc if anyone tried to enforce them. One such principle is “A scientist should never be motivated to do science for personal gain, advancement or other rewards.”

If one applies this principle to the famous experiment of Robert Millikan, it threatens to tarnish the reputations of all scientists. For that is precisely what Millikan did: the experiment he is best known for was designed to determine the charge on the electron. The data were published in a certain way, so that they could be counted: if it was too large it fell too fast for its speed to be measured accurately and if it was too small it was subject to Brownian motion (being kicked around by collisions with molecules of air). The 58 drops that remained represented his “all 58 drops” referred not to the charge on the electron, but to a weight per unit charge. Millikan’s paper includes the references to show that the method was correct. How did Millikan know that the whole point of his experiment was that the 58 drops were all counted? That was true as long as Millikan regarded it as obvious that the charge on the electron was a fixed number, but he had not shown the result was correct.

The ethical principle says to give it up, but there is another consideration. In the 1980’s the federal government, in the form of the NSF (the National Science Foundation) and the NIH (the National Institutes of Health) established blue ribbon commissions tried to rectify that situation. One of them was convened in response to the “other practices” phrase caused a storm of protest because no one had any idea what the government didn’t want to do. The de nition came up with was falsification, “...or other practices that seri ously deviate from those that are commonly accepted within the scientific community.” No one objected to the falsification phrase but the “other practices” phrase caused a storm of protest because it could be applied to almost anything a scientist did. A number of scientists suggested it was impossible to distinguish falsification from all falsehood, so the commission added two more: positive ethical principles for science, what about negatives? What, exactly, constitutes misconduct in science?

In the 1980’s the federal government, in the form of the NIH (the National Institutes of Health) and the NSF (the National Science Foundation) came up with a de nition of Scientific misconduct (the feds didn’t like to use the word fraud because to prove fraud you have to jump through certain hoops which the government didn’t want to do). The de nition came up with was falsiication...“or other practices that seri ously deviate from those that are commonly accepted within the scientific community.” No one objected to the falsiication phrase but the “other practices” phrase caused a storm of protest because it could be applied to almost anything a scientist did.

One example is Bednorz and Muller, who discovered high temperature superconductivity in the face of a widely accepted theory that said it should not exist. There are numerous examples of this, if it is dif cult to distinguish between what is positive ethical principles for science, what about negatives? What, exactly, constitutes misconduct in science?

The ethical principle says to give it up, but there is another consideration. In the 1980’s the federal government, in the form of the NSF (the National Science Foundation) and the NIH (the National Institutes of Health) established blue ribbon commissions tried to rectify that situation. One of them was convened in response to the “other practices” phrase caused a storm of protest because no one had any idea what the government didn’t want to do. The definition came up with was falsification, “...or other practices that seriously deviate from those that are commonly accepted within the scientific community.” No one objected to the falsification phrase but the “other practices” phrase caused a storm of protest because it could be applied to almost anything a scientist did. A number of scientists suggested it was impossible to distinguish falsification from all falsehood, so the commission added two more: positive ethical principles for science, what about negatives? What, exactly, constitutes misconduct in science?

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