Research Scientist 1 (RS1).

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John Krige (JK)
Interviewer

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JK: Thank you for coming by to speak to me about your research. Of course, I was aware that you had some sort of ITAR-related work because I saw you at the training session on ITAR. And just for the record, you have your Ph.D. for about twenty years. You're a solid-state physicist working on the optical properties of semiconductors. You've worked internationally. You've been at Tech for about ten, I think, ten years.

RS1: Eleven.

JK: Eleven years. Is this the first time that you've had a project that falls under export requirements of ITAR?

RS1: So far as I know, yes.

JK: And how come that has happened, exactly?

RS1: Because in this contract there were specific clauses concerning that. The sponsor had to approve publications, and I think that set it off, and also the nature of the work is basically, I suppose, dual-use or defense-related.

JK: Who is the contractor?

RS1: Ultimately, Office of Naval Research.

JK: Can you tell me a bit more about the work? By the way, we always stay in the unclassified domain. We never enter the classified domain. I imagine this is unclassified.

RS1: This is unclassified. I mean, what we're doing is actually, I think, fundamental science. So we're studying how light interacts with photonic crystals, so these are periodic arrangements of dielectrics and how to design these photonic crystals to basically exclude light from propagating through these materials at given wavelengths.

JK: And how can that become dual-use? Does it have a civil application?

RS1: Well, absolutely it has many civil applications, but the specific use that the sponsor has in mind is military.

JK: How come, therefore, this wasn't classified from the get-go?

RS1: Well, I don't think that this project is far enough along to really tell whether these ideas are useful or not. The people I work with at Johns Hopkins Applied Physics Lab indicate that if things go well, it's very likely that they might move it towards classified.

JK: So that will completely transform the way in which you handle your output, I imagine.

RS1: I imagine.

JK: Have you done classified work before?

RS1: No.

JK: So you don't know exactly how the restrictions function when you do do classified work.

RS1: No, I don't.

JK: Apparently, you have a foreign student on this project.

RS1: Oh, no, no, it's a U.S. student. So that was another thing. I really had to find a U.S. student.

JK: You were obliged to find a U.S. student, even though it's unclassified material?,

RS1: Yes.

JK: Why is that? Because it's dual-use?

RS1: Perhaps. I'm not sure.

JK: Who specified that requirement?

RS1: Navy, ONR.

JK: The Navy specified that in anticipation that it might be useful for military purposes?

RS1: Perhaps.

JK: So you have a U.S. student on it. Okay. Are you going to do some of this work in France, though?

RS1: Well, that's a good question. So I have initiated with someone who handles export control here. Evidently, there's a way to obtain a license from the, I guess, State Department to enable one to communicate internationally, so I thought I had initiated this. I haven't heard anything about it in months, so I have to kind of move this along, but absolutely, we're going to need, at minimum, the ability to communicate with my student who will be here.

JK: And the fact that you're abroad and he's here raises problems in terms of communication.

RS1: Potentially, yes, or transferring files, or me carrying data on my laptop, etc.

JK: The very fact that you're abroad is the thing that causes the problems?

RS1: That's right.

JK: You're not going to set up your lab in France to do this work?

RS1: No. The work will be done here

JK: The problem is simply communicating back to Georgia with the student who will be staying here.

RS1: That's right.

JK: And your forms of communication will be, obviously, verbal, but also file transfers and that sort of thing?

RS1: Verbal, email, file transfers, and also—so this program, actually, we're subcontractors of John Hopkins Applied Physics Lab, but the primary contractor is ONR, so we have to be in contact with the people we're working with at Applied Physics Lab, so whether a teleconference, emails, sending files.

JK: So the only sense in which you're concerned about communication is back to the States. You're not concerned about communication in terms of presenting results abroad?

RS1: At this stage, no, although ultimately, depending upon how things go, certainly this is a concern, but that hasn't arisen yet.

JK: And that would require your getting an export license?

RS1: An export license, yes, prior approval to present or publish things, or to release PowerPoint presentations, etc.

JK: On the other hand, prior approval to publish is one thing, but giving a talk at a conference is another because you can't control the audience.

RS1: Yes, that's right.

JK: Has this occurred to you? Have you taken measures for this?

RS1: This has occurred to me. The nature of the research, as it stands now, it's interesting. I don't know how earth-shattering it will be, how important it will be to present at conferences. The most important thing for me is to publish papers. Presenting at conferences is rather secondary. On the other hand, the student will have to present it to conferences and will have to address this when the need arises. So far we've worried mostly about publication. We've been informally told by the people we work with, who've spoken to the sponsor, that for work of a fundamental nature, getting approval should not be difficult, but we'll have to see what happens. I mean, they understand that there's a student whose job prospects rely upon publication.

JK: Presenting at conferences for your student in the United States, even, or abroad as well?

RS1: Well, I imagine anywhere. In the U.S., he would need some sort of approval.

JK: You say that publication is most important, but, of course, the advantage of conference is that you get immediate feedback.

RS1: Yes.

JK: And one reason for keeping this thing in the public domain is that you can benefit from what other people say in an exchange at a meeting, right?

RS1: Absolutely.

JK: But that doesn't bother you particularly?

RS1: Well, it's not a major concern, I should say. I mean it is a concern, but it's not the dominant concern when it comes to transferring information.

JK: If this has important civil applications, surely it would be extremely advantageous to present it in public, because for that side of it—

RS1: Absolutely. I think more than the applications, and who knows what the applications will be. My own interest is in the science. They're actually some, not major, but still, nonetheless, interesting scientific questions that we're addressing. So far the work has been scientific, so I don't think there's going to be any difficulty, but should our results be sufficiently good or interesting to the sponsor, then we'll see how basic, if they think it's fundamental research or not.

JK: Did you, in launching this project, check out what the fundamental research exemption is and if it applies to you, or is this something that you left to somebody else?

RS1: Well, I mean, I kind of know what it is informally, based upon presentations or materials from our office here, but it's not something I did a great deal of research on. My own understanding is that it's highly open to interpretation, which is cause for concern. One person's fundamental research is another person's, I don't know, military application, I suppose.

JK: Well, you know about the huge bureaucratic structure that there is in place here to make sure that you have the exemption or don't have the exemption. You have a clear distinction about what separates science from application, as does the NSF, it has basic science, applied research and development in its whole profile of the way in which it presents the distribution of funds to American research, yet this fundamental research exemption mixes them up completely.

RS1: Absolutely.

JK: How do you make the distinction so clearly in your mind?

RS1: Well, that's a very good question. I suppose that if I think about where I might publish the results, the sort of journal, so if the results look like they could be published in *Physical Review*, for example, then they're most likely fundamental research. If they're going to be published in even *Journal of Applied Physics* that's a problem. So I think that's kind of the easy way that I can distinguish between the two.

JK: What about the equipment that you're using? Because there are certain cases in which, even though you're doing basic research, the equipment that you use is ITAR-controlled.

RS1: So our work is just theoretical. So, I mean, we're talking about computers. Now, there are issues here, in the sense that I can't carry data or files related to this program. At least this is something I need clarification on, but there are restrictions on carrying files and materials outside of the country. So the computers that we're using are dedicated to this project. They're physically located in a room that's been inspected by, again, somebody from this ITAR and security infrastructure at Georgia Tech. The door is locked. The student closes the door when he works on the project. There are issues about the computer equipment that we use for this, so we don't carry around memory sticks or hard disks with data, and certainly not outside of the country.

JK: So this requires, in fact, that since you have one student working on this, that room only he or she has access to?

RS1: Yes. Well, presently, yes. I mean, if I have other U.S. students, I assume they can use the room. Now I have non-U.S. students we have to put elsewhere, and there is concern. I mean, I was concerned that this student would feel isolated, but actually he's very happy. He has this big room to himself. It's got a nice view out the window. He can play his music and he's close enough to other people. But ideally, I would like my students all to be kind of intermingling or together, talking to each other.

JK: We assume it's a he. He, of course, cannot talk about what he's doing to his colleagues.

RS1: Yes. Again, I should probably have this clarified, but he can discuss in very basic scientific terms, use the same words, I suppose, that other scientists working this area can use, but he can't, or at least I have told him not to talk about the applications, not to talk specifically about the applications, who is the sponsor or what they're going to use this for.

This creates problems, because I actually have a visiting student from China, so not a Georgia Tech student, a graduate student in Nanjing, who is working also on photonic crystals related insofar as the basic science goes, and there's almost a firewall between these two people. I mean, I really can't send her to talk to my own graduate student beyond just the most basic things. They're totally in separate places, separate buildings, working separately, and this is not ideal. Certainly at the stage in which this project is at [...] I have no idea about this Chinese student, but, I mean, we're doing science. It's hard to imagine that these restrictions really are protecting anyone from anything.

JK: Is the Chinese student deliberately placed in another building so she won't interact with American students?

RS1: No. That's just where the space was, but certainly I could not place her in the same room.

JK: When he presents original preliminary findings of his results, which he's going to present perhaps in some internal seminar, you will keep Chinese students out?

RS1: Well, I mean, right now what we're doing is I meet with him one-on-one. We have teleconferences with our collaborators. [...] If we have an internal seminar on his results, I'll have to talk to our sponsor to see is there some line or some boundary behind which we're safe and beyond which we really have to be careful, so just something we still have to look into.

JK: There's a huge amount of surveillance involved in running this kind of project, obviously. I mean, you can't be sure that he responsibly locks the door, that he doesn't speak to other students about this. Is this a cause of concern to you? How do you manage that?

RS1: I don't lose sleep over this. I mean, I think there are two sides to the issue. On the one hand, I think that the student has given every indication that he's responsible. On the other hand, I don't think we're doing anything yet, if ever, that is going to raise flags if he does talk or if somebody sees something and mentions to a third party, oh, he's working on something, and then it comes back to me. So I mean, if he talks about what he's doing, I don't think it's going to even register with anyone as unusual or outside the domain of basic research.

JK: As the project evolves, of course, it might become far more sensitive. As you say, it might actually be classified

RS1: Right.

JK: What's going to happen to the student's Ph.D. process at this point?

RS1: Well, a couple of things. One is he's actually somewhat interested in working at a government lab, so I think in that case the project even has certain advantages in the fact that he's interacting with people in government labs, working on topics of interest to the military. Now, you're absolutely right. At the current stage, if it's just a matter of getting prior approval, publishing basic results, I think that's not going to be a problem. On the other hand, if this becomes classified, we have to rethink how this is all going to work. Certainly the people we're working with understand this issue at Applied Physics Lab, but question is, I don't think the sponsor ultimately really is that concerned about personal issues involved in the research here.
JK: Have you built in some sort of cushion? Apparently, you're required in some cases to build in two years of extra funding so that if that kind of work becomes impossible for him to do and defend a Ph.D. appropriately, he can spin off into doing something slightly different which would enable him to get a Ph.D. in the normal manner.
RS1: No, there's no guarantee here. There's no insurance policy. So it has always worked out that I've been able to find funding for people if one program—it's so common. Most research programs are three years, but few Ph.D.'s correspond exactly to those, so I've always been successful in finding funds for a student if a program ends or whatever happens, if things don't go well. So I've explained it to the student that there's no insurance policy here, but that I've always been successful at finding something. So we'll just have to see what happens. In this program, it's actually anticipated to be three years, but it's renewed annually, so really its renewals depend upon progress. So even from a year-to-year basis, there's no guarantee about what happens.
JK: But even under the present regime, if it doesn't become classified, they have rather tight restrictions on how he can defend his thesis, right?
RS1: Yes.
JK: Explain to me what all the conditions are.
RS1: I really am not aware of all the conditions, though I have served on committees where these issues did apply, and I didn't see the back end of what was going on to plan this, but insofar as the mechanism for defending and releasing thesis to the committee, as far as I was concerned, it looked just like a regular defense. Now, I don't know what happened behind that. I also know that I think there's a rule that a thesis, you can withhold publication of a thesis for one year or something like that.

JK: That's true, yes.

RS1: So that rule also applied to this student whose committee I was on. Again, these are things I'll have to deal with when the time arises. My own philosophy is that rules change or people involved handling paperwork change. If I start worrying about that now, by the time I have to deal with this, the whole situation could have changed.

JK: Although the whole trend is to make it tighter and tighter.

RS1: Yes.

JK: Do you think Georgia Tech is exaggerating in applying that trend or do you think it's just the way things are?

RS1: Well, I think, given the legal implications, which can be quite severe, I can understand Georgia Tech's response. On the other hand, I think the entire philosophy behind this—and again, I don't know if I blame Georgia Tech; it's U.S. policy—I think it's highly exaggerated. For instance, our research, even if our work goes well, fundamental work goes well and our application pans out, okay, I mean, this sort of stuff may be not quite in the defense context. I mean, this kind of stuff is presented everywhere or published everywhere. There'd be nothing tremendously, I don't know, unusual to see the anticipated work published in the open literature.

Now, I also assume that if things go well, we get these results and even if they are classified, I would guess that it would give the U.S. a couple of years' advantage. This is not like a major—would lead to a major technological breakthrough. So I don't know. I think that the entire approach is exaggerated. I think that there really ought to be a much more clearly defined wall between what is export control where ITAR applies to and what is basically fundamental research. It should be very clearly defined and the bar should be fairly high, but as it is, it's very nebulous, the boundary between the two.

JK: You feel the bar should be high. Obviously, this is a huge impediment to your working in a smooth way, but is that the only reason? Do you think, actually, your research would benefit in the sense of your being able to interact more freely with others if the bar was higher? Do you think you're actually losing out, -- for example, the classic argument, -- you're duplicating work that other people are doing unnecessarily because you can't talk about things? What other reason would you have for having the bar higher, except that it's a pain in the neck?

RS1: Certainly it's very important to communicate with people. Yes, I mean, just the informal discussion and somebody says, yes, that could save yourself a lot of work. I mean, I suppose now with all the literature on the Internet and searchable, it's easier to avoid those sort of problems, but there's a lot of relevant expertise out there that we could really profit from, but it's very hard to talk to people in any definite terms about what we're doing and, therefore, get specific advice.

JK: Of course, people here regard the Europeans, in particular, as absolutely lax about this matter, and the French, in particular, as totally irresponsible because they collaborate a lot with people from the Middle East for historic reasons. Do you share that view or do you just think this is part of the exaggerated emphasis on the problem? Or do you think the French are lax or the Germans are lax, from your experience there?

RS1: I think on the academic side, no. I mean, I think it's actually very important to collaborate with people on the fundamental research side in countries, even when there are political differences, rather strong political differences with the United States. I think it's absolutely important to keep channels of communications open amongst people working in universities, because those are the people who are most likely to be able to moderate the regime or advise the regime in some positive fashion.

But certainly I am aware, not so much of France, but of German companies transferring questionable technology to countries that don't always—not that any country always has good intents, but to countries where there certainly are problems. So certainly on the industrial side I think there have been problems in Europe.

JK: There's a tussle, of course, between commercial interests and security all the time. America sets the bar rather high, sometimes to the frustration of American business, but Germany apparently sets it rather lower. So you've also worked with industrial organizations and in industrial labs. How does this kind of thing affect industrial laboratories, these ITAR regulations? Have you any experience of that?

RS1: I've not had experience with regard to the ITAR issues. I mean, certainly there are other issues working with companies, nondisclosure agreements. Actually, yes, there was a contract where ITAR things did apply and there were some difficulties because it was a non-U.S. graduate student working on the project. It created a lot of problems with regard to—I mean, this project never [produced] publications. It was a very short-term, rather [unclear] project, and the student had a lot of other publications. This was not an issue.

But there were a lot of things that came up about: Can we talk to you if I'm in France. We needed prior approval from the sponsor to have the student on the project. What can I show my colleagues? So it was an interaction of ITAR issues with nondisclosure agreements, and I have very mixed feelings because I think that one of the strengths of U.S. universities is the spirit of innovation and crossing over from fundamental research to applications, but on the other hand, I see this trend, lots of projects where people are working on things where there are restrictions, whether it relates to nondisclosure agreements or ITAR or whatever, and [this damages] the entire atmosphere of research at universities.

JK: Nondisclosure agreements apply to what is called proprietary knowledge, is that right? Or am I completely wrong about the meaning of proprietary knowledge?

RS1: Well, yes. I mean, if it's protected by a patent, then it's already okay. So proprietary knowledge is intellectual property that I guess has not been protected by a patent or other means. So if I'm working on a project with a company, they'll be talking about maybe what they've worked on recently and they don't want me to give away their proprietary knowledge to a third party.

JK: Proprietary knowledge applies specifically to commercially relevant information?

RS1: So far as I understand it.

JK: And it's the firm's knowledge that is proprietary, not yours?

RS1: Both, actually. So, usually, when we sign one of these things, and again, the overhead involved in dealing with the Legal Department here, it's a pain, but usually the nondisclosure agreement or NDR, I guess nondisclosure NDA or whatever it is, it goes two ways. Usually the university expects the firm to respect any prior intellectual property on our side as well.

JK: And who decides whether that is going to be intellectual property? The very fact that you signed the contract with the firm makes it subject to a nondisclosure agreement?

RS1: Well, the nondisclosure agreement is signed usually before we even really start talking about anything, before there's any contract. So if a firm approaches me, usually—I mean, it varies. Some of them are very strict. Before they even say a word almost, they'll say, "Look, we want to discuss something with you. Will you sign a nondisclosure agreement?" And for the most part, those agreements, there's a form essentially here and Legal starts filling it out. They'll send a copy to the firm. The firm sees it as a rather standard form. They may or may not want to make revisions. Then it's signed and then we start talking. Other firms kind of trust you and they assume that eventually the agreement will be signed and they don't worry about it so much.

JK: So work done under these agreements are also subject to all sorts of controls about publication. In fact, probably you can't publish at all.

RS1: Ultimately, yes. If there's a contract signed, then there are probably restrictions on publication approval. What also bothers me is, based upon my understanding, that once any restrictions apply on a grant or contract, that automatically kicks into effect ITAR or export control. Or maybe I didn't understand the whole thing correctly.

JK: I'm not sure about that.

RS1: That was what I understood. So if you're working with a U.S. company on a commercial thing, so long as there's a clause in the contract that involves a restriction on publication, then it was my understanding that's immediately kind of thrown over into the regime of ITAR or export control.

JK: Or EAR.

RS1: Yes. But I might have misunderstood that whole thing.

JK: I'm concerned about the transformation of academic life and academic research, obviously, [...] physicists, in particular, have always stressed the extreme importance of keeping it open and the only concern that they've had usually has been classified research [...] We have all of these controls penetrating right into the core of the academic enterprise at the moment on nonclassified work, in fact, and that's what I find quite unusual and quite disturbing, as you do, apparently.

RS1: I agree. I think it's really part of a—I mean, we focus on these restrictions, but I think there's some really long-term trends; as far as I can tell, fifteen, twenty years. So some of my first research grants were from Office of Naval Research, Ballistic Missile Defense, or BMDO, whatever it's called, DARPA, and twenty years ago, I mean, nobody even raised these questions. These were basic science grants from military-related organizations, but there were no clauses about getting prior approval. Nobody cared who you hired as a grad student, where you presented.

What's happened that I've seen is more and more, or maybe I should say less and less, there's less and less basic research funds available from these organizations and others, which has forced many people to look at funds where there are more and more restrictions. So I think it's not only insofar as restrictions on transferring knowledge and how you disseminate the knowledge. It's also where the funds are. If I could, I would try to avoid this funding, although I have to say that the project that we're working on now, at least so far, it's not a big deal, but if there were ample basic research funds from the NSF or from military organizations, then I think that we would encounter these problems less frequently.

JK: So the NSF is really not at all engaged in this kind of work. I mean, what about its work on nano? There's a huge NSF amount of money for nano. Does that also fall under these restrictions?

RS1: Well, I believe not, but what if you have an industrial partner on the NSF grant? I don't know if NSF has rules that say any subcontractor or whatever, there can be no restrictions on publication. So I have no idea. If I have a grant from the NSF, so far as I know, and it doesn't involve anyone else, I don't think there are any restrictions. I've never encountered—

JK: I think that they told me here they've only had one ITAR-related NSF grant, so maybe you're right. I mean, the basic point is that the people who basically have a huge amount of money for the kind of research you do are people interested predominantly in applications, either businesses or the federal military agencies, and that's imposing these restrictions on you.

RS1: Yes.

JK: Do you think the bar is anyway going up higher and higher, in any case, not just because they won't fund basic research, but because there's a growing sort of, you might want to say, paranoia about this information leaking?

RS1: Yes, I suppose, in a way. My experience with this sort of grant is fairly limited, so I don't really have enough data personally to see changes in time. I would also, though, say that certainly anecdotally you hear more and more complaints about this, more and more concerns raised. There's, roughly speaking, some sort of divide.

I mean, in our engineering department there are a number of people who see themselves doing basic research and then a number of people who really see themselves clearly as doing applications. I do hear complaints from people who I perceive as doing more scientific or basic research, but I'm sure there are plenty of people for whom this mode of operation fits into what they've always done. If they've always done industrial-related work with nondisclosure agreements, etc., well, this probably is not such a huge change. A lot of engineering is also different from physics. Many fields basically, I mean, almost express disdain when it concerns international conferences or why would we even pay attention to research coming out of Europe.

They have this very chauvinistic view that the U.S. is the only place where everything comes out of in certain fields. So I mean that's not how physicists view things, but—

JK: I think that's probably enough for me at the moment. So thank you very much.

RS1: Okay. It was helpful?

JK: Thank you, extremely helpful.

[End of interview]