What Is the Perspective from

Applied Science?

The primary motivation for choosing a research question must not be to seek personal recognition or funding. All of us that are doing research, even persons new to the profession, know that funding is an issue. However, I'm advancing the thought that funding should not be the dominant issue. I've seen many examples in the last twenty-five years where funding drove decisions for a number of individuals. I think that approach didn't work out well, either for themselves or, for that matter, for the field.

I want to read a couple of verses, John 12:42–43 (NIV), that might serve to get a discussion going.

> Yet at the same time many even among the leaders believed in him. But because of the Pharisees they would not confess their faith for fear they would be put out of the synagogue; for they loved the praise from men more than praise from God.

I know there are enormous pressures that all of us face. We do science research because we love the work. I consider myself extraordinarily fortunate to have worked in this field for almost twenty-eight years. But, for us as Christians, it seems to me that one of the primary motivations must be in seeking divine approval rather than the approval of other scientists in the field.

How Christians Approach Life

I think another aspect of this discussion must be the whole way in which Christians approach life. We certainly believe that truth exists. The Scriptures tell us clearly that this truth reflects or emanates from the very character of God. Truth is a reflection of God's character and we should pursue it. In Colossians 1:10 (NIV), where Paul is praying for the Christians in Colossae, he says:

> … that you may live a life worthy of the Lord and may please him in every way: bearing fruit in every good work, growing in the knowledge of God.

This verse is a spectacular one, isn't it? Growing in the knowledge of God certainly should apply to our life's calling. Every aspect of our lives should be pursuing the knowledge of him, which is pursuing truth. We ought to oppose any effort to avoid the truth. Whenever we're in a position that we sense an effort is underway to oppose the truth, we have an obligation to oppose that effort. I've been in situations where supporting the truth was uncomfortable because of political pressures that had built up. However, standing for the truth is an obligation that we have, irrespective of the context. I think this has a bearing on what we choose in our research decisions.

Every aspect of our lives should be pursuing the knowledge of him, which is pursuing truth.

J. Gary Eden, *Ph.D. University of Illinois, was a National Research Council post-doctoral research associate at the Naval Research Laboratory and then was appointed a staff member of the laser physics branch. He joined the University of Illinois faculty in 1979 where he has been engaged in research in atomic and molecular laser spectroscopy, the discovery and development of visible and ultraviolet lasers, and the development of photo-chemical vapor deposition. He is a fellow of the IEEE, the Optical Society of America and the American Physical Society, Editor-in-Chief of the IEEE* Journal of Quantum Electronics, *and has served as the Assistant Dean in the College of Engineering and Associate Dean of the Graduate College. Dr. Eden was the James F. Towey Scholar from 1996 through 1999 and is professor in the Department of Electrical and Computer Engineering, and Associate Vice-Chancellor for Research, as well as a research professor in the Coordinated Science Laboratory.*

What Discipline Perspectives Guide Us In Choosing a Research Topic?

Applied Science

During my years of doing research, I've seen a number of fads arising out of priorities set by the funding agencies in Washington. Maybe it was a momentary flurry of excitement that resulted in scientists quicky moving into a particular area. In talking with individuals who were making decisions to work in this area, it became evident that some were doing it for what I personally believe are the wrong reasons.

Let me talk about one example: high temperature (T_c) superconductivity. In the mid-1980s, it was discovered (by Chu and others) that some copper oxides would operate as superconductors near the temperature of liquid nitrogen, 77°K. This was a tremendous discovery. The funding agencies decided almost on the spot that they were going to put a lot of money into this area. Almost overnight, individuals who had little interest in superconductivity or some of the underlying physics that's associated with it, were sending out research grant proposals solely because they knew funding was available. Remember when cold fusion was in the news? Many purchased deuterated water, heavy water, to get in on that research area. When a funding agency sets a new specific priority, it can provide powerful motivation to a scientist to begin research in that area.

In my own field, this is often done in the Department of Defense (DOD) and sometimes by the National Science Foundation (NSF). They will set priorities, making it clear that they are accepting proposals in a particular area. It's difficult to avoid moving in that direction because of the availability of new dollars. If there is a natural intellectual curiosity that's drawing us to that topic, then I think that's a great thing, very defensible. ☆

Discussion Session

Eric Forbes Y. Hom is a graduate student in biophysics at the University of California at San Francisco.

Eden: *Does anything of what I've said raise any issues with you? I'd love to hear objections.*

Audience: *Right now it seems that some grant agencies are "throwing seed money" at specific projects to see if they are worthy of continual funding. That doesn't seem like a bad idea because some specific projects may merit an investigative look. While it seems that some people rush into a new field because there is potential money available, are there other important factors such as a natural, intellectual curiosity that drive the direction of the research? Is it defensible for a Christian to be primarily motivated by the availability of money in choosing a research project or program?*

Audience: *While this is a little far afield, I think it is relevant. I'm the director of a nonprofit organization. Some board members have located possible funding from civic clubs for proposed work that is not within our mission statement. That makes the decision simpler. Even though the money is available, we can eas-*ily decide to turn it down because we have a mission statement that directs us.

Audience: *Here's a different angle. I studied physics. I saw that it would be very hard to continue the research that I was doing initially because of personal and funding reasons. Now I do something quite different—robotics. Why not?*

Eden: *If you see a new field that has genuine intellectual **and** funding opportunities, you might wish to switch to it. But if money is the sole factor that is driving the change, I think that would call for real introspection.*

Audience: *I think there's an interesting tension here. You used one principle to urge us to not seek recognition and/or funding. However that seems to be opposed to the typical academic charge of faculty members needing to seek funding and to impact their discipline. To make an impact requires recognition of good work. How can this tension be resolved? How does it relate to having a mission statement?*

Eden: *I think we have a great illustration in the life of Michael Faraday. Faraday's ambition was not to be famous. What we're talking about is motivation. Some of the greatest people that I've known in applied physics and engineering are highly motivated individuals because they loved their research field. That's an apt description of Michael Faraday who did not pursue recognition, although he certainly received it. Faraday is widely viewed as one of the giants in physics. Another good example would be Isaac Newton. The motivation to pick a research topic that will catapult me to the top is quite different from the motivation to pursue a topic because of interest and fascination.*

Audience: *How about pursuing a topic that will make me effective in mentoring students and thereby positively affect the university? While I might not have a passion for superconductivity, but by choosing that topic I may be able to satisfy academic requirements so that I can shape minds and mentor students at the university.*

Audience: *You don't want to shape student minds into doing things unwisely. It may not be right to be mentoring students in research so you can show them the "smart" way to get funds.*

Eden: *While I agree with the last comment, the goal of mentoring young people is the most important part of research for me. I'm sure that value is shared widely by others who are here at this conference.*

Audience: *If you're looking for a specific topic, you must first assess the available supervisors, since they are the ones who determine the available topics. It does not work for a Ph.D. student to say, "Here are my noble goals and here's the topic I'm going to study regardless of what the faculty are interested in." It may not be appropriate to say that I'll never go where the money is or to only study a topic of personal interest.*

Eden: *My introductory comments were based on the perspective of a supervising faculty member. A graduate student is in a different situation, where the only real option is a choice of the supervisor. If you as a graduate student have received offers to work in several different laboratories, you can go and look at the laboratories. Then if you have some concerns after talking with one of the faculty members, that enters into your choice of supervisor. You don't want to get into a situation and find out that your supervisor wants you to work on something that is either unethical or makes you uncomfortable. A graduate student does not need to feel boxed in. Is there a scenario where you feel boxed in? A couple of you grad students could tell us about it. Tell us about your choice of supervisor.*

Audience: *To some degree, I get the impression that my supervisor is an anomaly. What she does for research is based on her grad students. Her grad students' interest can change her research focus. She did her thesis on planning but she doesn't do planning any more because she doesn't have any grad students that do planning. So, to some degree, it's almost like you have free reign to do what you want to do.*

Eden: *Is she providing leadership?*

Audience: *I think so, from my perspective. She took what I was interested in and tried to mold that into a good research*

problem. She is interested in machine learning, robotics, and the issues of how robots behave in some environments. She does know what good research is and she can always give helpful directions.

Audience: *I think that having a mission statement as a basis for your projects will prevent you from being tossed about by whatever is flashy at the moment. As an example of that, I was reminded of a speech given by our governor where he said that he thought we should grow hemp in our state. Two weeks later, my advisors included that in their funding application to the state legislature. In this case, the governor liked the idea, but the legislators crossed out that part of the grant.*

Audience: *Does it change what research they would do?*

Audience: *Sure. They wouldn't do hemp research unless they get money for it.*

Audience: *Would that dramatically change your lab or what you do for the next three years? What's the difference of growing hemp as opposed to sunflowers?*

Audience: *Introducing hemp is a dramatic change because you're bringing in a different species that you've never worked on before and you probably know little about it. So it's a huge change.*

Eden: *Is there an intellectual reason to pursue hemp growing or is the change proposed simply to get the funding?*

Audience: *That needs to be evaluated. There's some research on hemp in Canada and it's been somewhat disappointing.*

Eden: *When I was going off to graduate school, I asked a young man who had become a Christian during his graduate studies, "How do I choose in which area to work? So many things look fascinating to me and I don't know which lab to chose for my work."*

He said to me, "I'm going to give you some advice that sounds really strange. Pick the person that you like best. Because if this person is fun to work for, you'll learn to love what he does."

On the other hand, if you choose a subject that you really love but work for a mentor who creates extraordinarily difficult working conditions, you'll start to be repelled by the subject because you'll associate it with the difficult individual. I'm sure it's possible to separate the mentor from the research subject, but it's a human reaction to associate them.

There are very good reasons for switching research topics, aren't there? We've talked about a couple. Your interests may change. My students rarely study for their Ph.D. research, the same area that was the subject of their Master's thesis. When they come to my laboratory, I tell them that I hope they will see a number of different technologies and science issues. The variety makes them more valuable and enriches their training. So, there are a number of good reasons for changing a research topic. However, if money is the sole determining factor for change, I don't think that's good for a Christian.

I want to be a faculty member that trains young minds. That's what motivates me. The universities, whether they are public or private, are putting enormous pressure on faculty.

Applied Science

Session IV

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I'm amused by the ads that I see for faculty. Every single ad looks like they're looking for the top person in the country who has to be a superwoman or a superman. A lot of pressure is being put on young faculty, in particular. If the goal of the faculty member is to train young minds, then the way research topics are selected and the laboratory culture are important. All of these things together tell our students about what Christianity means to us. I think the whole package of how we run our lab, how we teach, and how we secure funding is vitally important.

Audience: *What was your earlier point about opposing efforts to avoid the truth? Have you had experience with projects where people had results that they didn't want or that were fudged? Is that what we're talking about?*

Eden: *While the issue hasn't come up frequently, I'll tell you what I have in mind. I was at a research laboratory in Washington for several years in the late 1970s. A new type of laser was discovered that has since turned out to be important for several applications, including vision correction. This ultraviolet laser works well in micromachining the front of your cornea. In those early years, the characteristics of it were so spectacular that one government agency, in particular, was pouring enormous funding into it. When I was with the Navy, we often were asked to evaluate proposals that were presented to the government. I remember a few individuals coming and making presentations to program managers who had a considerable amount of funding, claiming that they could get considerably more power from the laser than all of us knew they could get. Everybody in the room knew that what was being claimed was wrong. Because of the inflated claims made by some, it hurt laser technology. It got to the point where nobody believed the numbers, even if they were correct and perfectly legitimate. So, a small number of highly placed and influential people made statements that ultimately hurt research in the rest of the field.*

Audience: *I've seen situations where researchers don't want to show negative results. Rather than presenting something that's not truthful, only the positive part is represented, because most fields don't seem to tolerate negative results. Somehow a negative result is seen as wasted effort or failure. I try to teach my graduate students, at least at the level where we're working in the lab, that a negative result is a really good result, because it tells you something important about your effort.*

Eden: *I couldn't agree with you more. I've said to my students, "No is a perfectly good answer.*

'No' means that you have good data and the idea looked promising, but it's just not going to work."

Audience: *I'd like to hear from graduate students working on their dissertation research. The research is expected to be stupendous and make a huge contribution to the field. If it doesn't, then the thesis is not a good one and a temptation comes to fabricate results.*

Eden: *Do any of you feel pressure along those lines?*

Audience: *My advisor often encourages me to make the story simpler, not so complicated. Other people say the complex parts are the interesting parts of it. To what extent is it truthful to give a paper that's so complicated no one will ever read it? Or do you try to simplify a very complicated paper? I don't bother writing up and submitting some aspects of my research for publication because I get the feeling that they wouldn't be accepted.*

Audience: *I don't either. However, I have found that you can include negative results if you end up with positive results also. We present our work by saying, "Here are all the things we tried that didn't work and then we found this one thing that did." Then we write papers to publish the positive but not the negative results. You must keep working until you get a positive result or else the work doesn't get published.*

Eden: *Those who work in research know that you spoke correctly. There are going to be lots of failures. I think it was Edison who once said that the best way to have a good idea is to have lots of ideas. That's true. You have to have lots of ideas and then one of them works. I tell my students that you need to have a high tolerance for failure.*

Audience: *Someone implied that you must almost "sell your soul" to the research project. If there's any area where being a Christian should affect how to do research, it's believing that there is more to life than the research project. A geologist, who has a wife and five children, told me that he has made very definite research choice decisions that would allow him to spend more time with his wife and family. Others who are not so careful experience divorces and family separations.*

Eden: *Put that concern on the list and call it "priority."*

Audience: *I have a friend from graduate school days who was getting his doctorate in math. At that time, I was very active in the InterVarsity chapter trying to get this friend to be active in a*

Bible study. Well, in that time of his life, he couldn't participate because frankly he was over achieving and didn't have time. He was always exhausted and unhappy. I now occasionally see him thirty years later. He's still over achieving and still uptight. I expect to hear any year he's had a heart attack. His marriage has held together, but his wife doesn't see him very much. When she does, she sees an uptight, sad man. It isn't worth trading your life for research.

Eden: *I couldn't agree with you more. I think it is a tragedy to take something that should be noble, beautiful, fun and exciting and convert it into something that is a terrible burden. I've told my graduate students that my hope is that their graduate years will be some of the best years of their lives. I hope they will look back and say, "As a graduate student, I was never more free. I wasn't wealthy and I didn't get paid what I was worth. But I had a good time working in interesting research. Those were good years." From the Christian perspective, science research should be a noble calling and something that should just be fun.*

Audience: *I think research is something that we don't make happen on our own. Good ideas come from God. As a Christian believer, I believe that God is the one who inspires me. Two statements summarize the wrong way of thinking for a Christian: (1) "I'm going to make it happen." (2) "I'll do whatever it takes." As believers, I don't think God wants us to live that way.*

Eden: *I completely agree. One issue we didn't discuss is that before a research area is determined, one must discover the talents God has given. I am fascinated by a passage in the book of Exodus in which God commissioned the construction of the Tabernacle and told Moses that two people are to lead the work: Bezalel and Oholiab.*

> *Then the Lord said to Moses, "See, I have chosen Bezalel the son of Uri, the son of Hur, of the tribe of Judah, and I have filled him with the Spirit of God, with skill, ability, and knowledge in all kinds of crafts—to make artistic designs for work in gold, silver, and bronze, to cut and set stones, to work in wood, and to engage in all kinds of craftsmanship. Moreover, I have appointed Oholiab son of Ahisamach, of the tribe of Dan, to help him. Also I have given skill to all the craftsmen to make everything I have commanded you" (Exodus 31:1–6, NIV).*

> *These verses tell us something spectacular. The last part of verse six applies to all of us because it says, "Also I have given skill to all the craftsmen to make everything I have commanded you." So it wasn't just those two gentlemen who were given skill, but it was all of those involved. I think that hits right at the heart of what we're talking about. Everyone around this table has skills of a certain kind to give as an offering to the Lord. We need to recognize that and say, "Lord, I'm excited about doing this. I recognize that I have these skills. I'm going to use what I have with joy."*

> *We also didn't talk about competitive issues. I didn't hear that come up in the discussion. For example, some research areas in atomic and molecular physics might require specialized, expensive types of equipment such as an accelerator. Even a large NSF single investigator research grant will not be able to purchase an accelerator. So those kinds of research activities are*

better done at the national labs. Some popular research areas have so many people working in them that it is difficult for an individual to make a contribution. Those are strategic issues in research. I don't view them as ethical issues if the other considerations that we have been talking about are met.

Audience: *Referring to the last point, my thesis topic was chosen because there were too many people working in the area of my initial interest. I knew that I wasn't going to be able to do something unique. I didn't switch to something I didn't want to do; rather, I switched to another area that interested me. I don't think I made an improper decision.*

Audience: *I think it's very pragmatic and I don't think it's wrong for a believer to be strategic and wise. I think it's wise to assess your talents, the environment, and the way you can fit in the research field.*

Eden: *What about societal impact? Does anybody struggle with that issue?*

Audience: *I'm in robotics research. I know my research group is already involved and will get much more involved in military things. If the military can use robots instead of people, the US soldier death rate would be lower. Just think about recent events in Yugoslavia or Iraq. If robots would have been used, more people would have been saved from the NATO side as well as in the country being attacked. Should I avoid that research topic because it's military and it's aggressive and, in the end, people will be killed? Or, should I say, this is actually a good thing because fewer people may die? That's the issue with which I'm struggling. I don't know what to do.*

Audience: *It's really intriguing. I never even realized that was an issue. War does seem problematic if people don't want to risk their own lives. If you're willing to kill someone else, you should be willing to risk your own life also. A government that can kill others without risking their own children is a frightening idea!*

Audience: *Someone spoke at an InterVarsity graduate conference a couple years ago who had developed a method for satellites to map crop development. The project was supported by a huge grant from the Central Intelligence Agency (CIA). Through that work the CIA thought they could, in a state of war, destroy all the crops from the air. The idea was so extreme that the speaker and his research group actually destroyed key data in the program so it couldn't be recreated. They almost got themselves fired. The speaker believed it was unethical to target the civilian population by destroying their food source as a means of war.*

Audience: *The other day my advisor asked how we felt about taking funding from the military or the National Security Council (NSC) or the CIA. I guess someone from the NSC offered him money for research. My advisor's response was, "Well, if you want to give us money, that's fine." It's only a problem for me, if they want me to do something I don't want to do.*

Audience: *Well, here's another issue. One of the research projects I've worked on could be used by a government agency to spy on private telephone conversations. Right now one of the reasons we're not so worried about people listening in on our phone conversations is because there are too many phone con-*

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Session IV

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versations. But, if a computer listens to a phone conversation and can determine which conversations are of interest, then everybody's conversations could be monitored. This project looks suspiciously like they plan to use it improperly even though they didn't say so. I had to think, "Do I want to have anything to do with this project?"

Audience: *What is the framework that we use to decide about our work? Practically everything can be used for wrong.*

Audience: *Someone said that you can't predict how things will be used or what their impact will be, so stop trying. However, you don't want to use this reasoning to avoid getting out of something you know is a bad thing either. What's the framework we should use to decide?*

Audience: *It would be nice if researchers could stay involved with the way technology gets used. If you refuse to work on a research project because you think it may be used unethically, then someone else will do the research. Maybe by working on the research project you can influence what people think about its ethical issues. That involvement may make you more useful than if you had said "hands off" altogether. Is it possible to do research and also have a say in the ethics of its use?*

Audience: *I did my Ph.D. research in nuclear physics, which had nothing to do with weapons or energy. But I found myself exposed to the history and development of the atomic bomb. Maybe we can take that as an example, at least to look at what happened. Some physicists came here and developed a bomb because they were afraid that the Germans would discover it first. They were also very excited because it was a great idea. When they developed the bomb, they found that they couldn't make the decision to really use it. The usage of the bomb became a political issue and many scientists regretted that they were involved in its development. Yet, they must have seen the consequences. More recently during the cold war, many physicists, who were involved in trying to build trust between the United States and Russia, attempted to educate the public about common issues involving people in both countries. Physicists also tried to meet with scientists from the other side in order to exchange information and to build trust. They wanted to establish a working foundation that would minimize risks. Can we use that approach as a model? If we're involved in critical military research, we should try to be involved in the related decisions and we should inform the public about it.*

Audience: *It seemed like the lesson from that story is that once the technology is developed, it's out of your control.*

Audience: *Maybe it isn't totally out of your control.*

Audience: *The scientists that developed the bomb could have changed the landscape of the decision of its use if they had gone public with the knowledge they had. The entire political process involved in whether to use the bomb would have changed completely with public awareness.*

Audience: *I don't think the outcome of the bomb use decision would have changed. The exact same thing might have happened even though the way the decision was made would have been changed.*

Audience: *Albert Einstein was very influential in getting the atomic bomb started. I think he had a tremendous influence by what he wrote in a famous letter. I have the impression that if serious, well-established scientists speak out about nuclear weapons, they can have more influence on public opinion than any politician can.*

Audience: *I want to continue with the nuclear example. If the scientists who developed the bomb would have thought ahead and realized that they were going to regret the use of these bombs, then it would have been more effective for them to have refused to develop the bomb than to try to control the bomb after its development. If enough people refuse to work on something, it's not going to get done.*

Audience: *That framework for dealing with a problem is called "relinquishment," right? It means to agree that you're not going to pursue something. It is debatable whether that's a reasonable way to solve a problem. If the US would not have pursued bomb development, another country may have developed it with a different outcome that was lot worse. It is really hard to know.*

Eden: *That's right. I think a very strong argument is often made in those cases. Get out in front and know it better than your foes. What you know you can control and what you don't know you can't control. In other words, there are ways of preventing somebody else from using it if you know enough of the physics of it. That doesn't apply to this particular discovery, as far as I know, but just relinquishing it is sometimes not the best option.*

Audience: *Another example that is more current might be the Internet. It's a technology that has been developed and you can't really predict*

the consequences of the Internet for the next fifty years and the way it's going to change the world. You can speculate about it, but I say the choice is to not pull the plug against the horrible things that happen because of the Internet but to try to control it.

Audience: One speaker said, "Step back and be in wonderment of what you're doing and think about how God is in physics or chemistry or the stars." Does that change because we're doing applied research? I step back and I see a computer. On the eighth day God created computers? In some ways I feel like I'm not looking at the creation of God.

Audience: Computers are a human creation, but of course, God created humans.

Audience: It's difficult to think that God holds this computer together, because it's not really the natural world. It's hard to think about it that way. So we're one step removed.

Audience: If the computer falls apart, you can't blame God either.

Eden: It is a testimony to the skills that God has given us that everything we construct is still from creation. We haven't yet concocted something that we haven't taken from the created world. We've taken all our tools from creation, whether it's an atom that we split or materials we mine out of the ground. Even when making synthetic materials with molecules that aren't normally found in nature, one still must use atoms that are found in nature to put together the new material. I'm still working with the tools God provided and using a brain that he provided.

Audience: That reminds me of a joke I heard. Some scientists went to God and said, "We want to have a contest because we think we can create stuff on our own. We can make humans." God said, "Fine. Let's have a contest. Do just as I did back in Genesis." And they said, "Great!" They started gathering up dirt and God said, "No, wait a minute. You go get your own dirt."

Audience: I understand that God is in my robot because a created being built the robot and because it uses matter or electricity to work the way it does, according to God's laws.

Audience: In my studies, I make very small magnetic particles that go through all sorts of processing. One way I see God in my applications or in my engineering is that, while this particle is such an intricate little human-made thing, I know God knows all about it and has allowed me to discover it or understand it. In the same way, I could be the little thing he also intricately desires to know.

Audience: Sometimes trying to build something simple takes all the effort I have and so many hours of hard, intense work. Then, when I meditate on God's creation, I'm even more in awe of the design, the robustness of everything that God is able to accomplish. It knocks me down and humbles me. Our capabilities are great, yet very weak compared to what God can do. So sometimes it's not our technical strengths but our weaknesses that help us to see.

Eden: That's really true. The longer I work in the field, the more I realize the almost superhuman effort it takes to make the simplest thing work. For example, one of my students has made a glass fiber laser, using a synthetic fluoride glass. But I know that God knew that was possible, so I feel the same way that Newton must have felt. God understood that the fiber laser was a possibility. I think he is pleased when we find those things.

Audience: Just being in this group makes me aware of the lack of community that I normally have to discuss things like applying technology. I wondered if all of you had any aspirations of either building a greater community like this or if you already have found it. For example, I make little microsystems. I don't know if these things might be useful on the mission field somewhere. Have you found places to discuss these kinds of things?

Audience: I have a community group. We have a weekly prayer meeting with about six faculty members from the College of Engineering. We're all professors. It's great to get together and talk about the struggles of believers in response to certain things that come up. It's great to be able to pray over things that are very specific instead of the kind of general things that you would feel more comfortable mentioning in a regular prayer group where people don't really understand what you're doing and you don't want to burden them with those details. It's been wonderful and I would encourage you to meet and pray together. Start by just praying about your work realizing that things you're working on come from God.

Audience: One thing we're talking about is social impact. I am alone, off by myself. To do the things that are envisioned requires Christian people in various disciplines—political science, economics, sociology, and a lot of different fields—to gather and work on the problem. Much of our research doesn't necessarily have direction for the social good. I was wondering if a group of applied scientists can predict the outcome of a given research focus. If we can get together and build an atomic bomb, can we build something that's really for tremendous social good? Will I be able to maintain a vision that's different from my department for the kinds of things I want to do instead of getting swallowed up or let my contribution be so small that it's never going to matter? It is more than just knowing people in other places but to really collaborate with other people. I have vision. I have a longing for a true Christian community of researchers that work together toward something.

Eden: It's exciting to hear what you're describing. Perhaps one possible manifestation of what you're describing could be a society of Christian engineers, a group that tries to bring together individuals to effect action of different kinds. I'm sure you're all aware that in several disciplines Christians have formed academic societies. There's a strong one in philosophy and they hold meetings along with the annual meetings of the American Philosophical Association.

Audience: Another group I have been a member of since I had my first job is the American Scientific Affiliation. It has given me a sense of bonding with other evangelical scientists and engineers.   ☆