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The second sector, the government sector, which is largely federal but growing at the provincial level, has a large body of scientists. Their reward system is directed toward applied research to support the mission of their department, agency or whatever. Their goal and reward is the publication of international, national or provincial reports; it is not making money.

Let me come to industry. The task of industry in this field is to use research, development, engineering and marketing to generate revenues and profits from innovation. This takes a lot of confidence, and you have to know what you are doing because you are risking large sums of money and the success is not high. It takes confidence in the management of technology, which anyone will tell you is a difficult and rather chaotic task.

I think—and I am speaking for myself, not my company—we have massive structural problems in all three sectors. In the university system, as you heard, we have a laissez-faire funding policy which lets the researchers be the best judge of what they should be working on, and, by and large, that is the right approach until you get into trouble economically, and then one would like, somehow, to mobilize that energy and steer it a little into places where it will do the most good. But the work in universities will remain basic research.

Basic research is no good unless it is excellent. It has to be world-competitive and at the top of the tree. We could spend a whole day debating this point, but we have created an education system in this country which costs a very large amount of money by national comparison and produces rather mediocre results. I guess we all know this. We are perhaps one of the few developed countries in the world that have not achieved a sort of tertiary or top level university system to draw the rest forward. The competition to get into the University of Tokyo is so savage that it is like a football game. People who get in are cheered and carried around, and, once they are in, they know that they are at the top and that they will be expected to lead in the country thereafter. The same is true of some of the great institutions of Europe and the United States. Unfortunately, we have not achieved that here, and it is something that I would like to talk about later.

Moreover, in the government sector we have government science structured for the first half of this century, and we are almost out of the second half. It appears to be an intractable problem with immense political ramifications which no one is prepared to tackle.

Another point is that we have an industry base without much experience or confidence in the things that have to happen now. Let me put this in perspective for you. Let us look at the industrial revenues that contribute to GNP in this country and isolate the high-tech sector, so called because of the phar-

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maceutical industry—which we will not go into—which does not show on the list. So the high-tech sector in Canada is very largely electronics and aerospace. Those companies spend about 14 per cent of their sales on research and development, collectively, and they get about 5 per cent of private sector revenues, which amounted to about \$10 billion in 1986 figures, whereas, the rest of industry has a cashflow of around \$195 billion and spends collectively about .8 per cent of those sales on research and development.

So you have one segment at about 14 per cent of sales but only 5 per cent of the cashflow of industry goes through their hands, and the other at less than 1 per cent with \$195 billion flowing through its hands. In terms of industrial research and development, the two groups perform about 50-50. The top group, the high-tech group, does about 47 per cent of R&D performed by industry in Canada, and the other, large group performs the remaining 53 per cent. So the task in industry, if you want, is that, for every dollar that, for example, Spar Aerospace holds as the money flows through the company, there is \$20 in the other low technology or low knowledge-intensive companies. What happens to that \$20 bill if profit becomes ultimately important? Traditionally, it has been spent on what worked before, that is, on economies of scale and expansion of capacity. For the last ten years or more that has not been a successful formula. Companies like ours are actively working to redirect some of that revenue to things that have higher growth profit potential, and, by definition, they have a higher knowledge intensity, a higher technology intensity and are more difficult to manage and more difficult to bring on.

I thought, rather than reading a brief—because I am sure you have lots of those—I would bring along a diagram. I did bring a few copies. I will describe it to you.

About six weeks or so ago, there was a trade delegation from Sweden, led by the King of Sweden, which I attended and in which I participated. I spoke in a symposium to launch the visit to Ottawa. One of the Swedish representatives produced a cartoon of the research expenditures in Sweden which is on the left-hand side of this diagram.

The reason I am using Sweden as an example is, as we found in that symposium and as you all know, there are a lot of commonalities between Sweden and ourselves. We have a lot of natural resources; we have small populations in relation to our geography; and we stare down on the map at very large, very sophisticated businesses and markets to the south.

Sweden, with eight million people, has 22 multinational corporations headquartered in Sweden which are in the Fortune