

III. CURRENT ISSUES AND PROBLEMS:

1. It is clear that while we have made great strides in our scientific development during the past two decades, our present development with respect to the application and utilization of science is alarmingly unbalanced. We have not achieved a sufficient rooting of R & D in the industrial sector, nor has existing industrial R & D developed a sufficient momentum for growth to assure the future welfare of advanced industrial technology in Canada. The reasons for this are complex and go well beyond a willingness on the part of Canadian industry to undertake a greater effort. Our present industrial climate, structure, and resources are not sufficiently favourable to induce industry to undertake major long-range R & D programs. Longer range programs to develop new advanced technology frequently require a lead time of from five to ten years and an economic return may not be realized until ten or twenty years later. Investment in industrial research must compete with other forms of investment which an industry can make. Since many industries are chronically short of capital, it becomes difficult to fund industrial research and much more difficult to do so when the economic return may not be realized until ten or twenty years later. Accordingly, our minimal industrial R & D effort has concentrated for the most part on short-range programs likely to produce a more immediate return. More often than not this is concerned with minor extension or elaboration of existing technology rather than with the development of promising and entirely new technology. Both are essential, but the latter is more likely to provide the challenging opportunities in industrial laboratories which will attract the highly gifted and creative scientists and engineers. Their presence in the industrial environment will greatly stimulate innovation generally. Our deficiencies in these respects today will increasingly compromise our economic potential ten or twenty years from now.

Research and development, although it requires the greatest lead-time, and therefore must be provided for and planned well in advance, is but one part, and usually the least expensive part, of industrial innovation and successful economic exploitation. As a nation we must make a much greater commitment to new technology. With limited resources we cannot of course hope to challenge on all fronts. But by being selective and concentrating our efforts we can become pre-eminent in

those areas where we have a favourable base or special advantage. As part of Federal government policy these areas should be identified and given special support and encouragement on a priority basis. Possible areas which should be considered include transportation, telecommunications, building materials and building technology, environmental pollution, metal physics and metallurgy, marine sciences, food technology, energy and power technology, northern development and specialized computer technology.

2. In order to exploit and assimilate new scientific knowledge and technical information, and develop engineering design data, it is essential that research scientists and engineers have ready access to the rapidly expanding world-wide information pool. This means on the one hand that industry must have scientists and engineers competent to interpret and assimilate this knowledge, and secondly, a rapid system of information dissemination capable of providing them with the special knowledge they require. Through the National Science Library and Technical Information Service, the Council has attempted, during a long period of time, to provide a stockpile of scientific and technical information and a mechanism for its transfer into industry and universities. A period of transition has now been reached when new technologies—the digital computer on the one hand, and high capacity information transmission networks on the other—make it possible soon to increase greatly the extent of the services offered. In the immediate future, it seems likely that an expenditure to make existing scientific and technical information widely available will be more rewarding than an expenditure simply to gain, through research, new information. Consequently, the provision of computer and data transmission systems to the National Science Library to an increasing extent can be anticipated.

3. Science generally in Canada has now developed a reasonably broad foundation and considerable strength, though somewhat diffusely based in a considerable number of university laboratories. The most immediate needs for the future will be to develop greater depth and concentration in important selected areas. The Council's recently established program of Negotiated Development Grants is intended to aid his objective. Grants of this type have already been awarded to a number of universities in such areas as materials science, pestology, mathematics and