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Article abstract

The Science Council of Canada (1966-1992) operated as an 'arms-length' agency providing science policy advice and recommendations to the federal government. The Council was always a voice for state interventionism. In the late 1970s, it turned to the politically sensitive issue of industrial policy and advocated a nationalistic, 'transformative politics' through its defense of technological sovereignty. An examination of its research and policy recommendations, and the controversies they excited, reveals that the Council's struggle against new policy trends in its final years paralleled larger transitions in public perceptions of the role of government in Canadian society. Its 1992 dissolution symbolized Canada's reorientation from a state-directed to a market-oriented approach to science and technology policy-making. This paper reviews the Council's guiding philosophy and discusses its history within two larger contexts: the Canadian political debate over continentalism, and evolving conceptions of science, technology, and innovation, and the prospects for their management.

Canadian Science Policy and the Retreat from Transformative Politics: The Final Years of the Science Council of Canada, 1985-1992¹

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Abstract: The Science Council of Canada (1966-1992) operated as an ‘arms-length’ agency providing science policy advice and recommendations to the federal government. The Council was always a voice for state interventionism. In the late 1970s, it turned to the politically sensitive issue of industrial policy and advocated a nationalistic, ‘transformative politics’ through its defense of technological sovereignty. An examination of its research and policy recommendations, and the controversies they excited, reveals that the Council’s struggle against new policy trends in its final years paralleled larger transitions in public perceptions of the role of government in Canadian society. Its 1992 dissolution symbolized Canada’s reorientation from a state-directed to a market-oriented approach to science and technology policy-making. This paper reviews the Council’s guiding philosophy and discusses its history within two larger contexts: the Canadian political debate over continentalism, and evolving conceptions of science, technology, and innovation, and the prospects for their management.

Résumé : Le Conseil des sciences du Canada (1966-1992) est une agence qui fournit des recommandations au gouvernement fédéral tout en conservant un certain degré d’autonomie. Au cours de son existence, le Conseil privilégie l’intervention de l’État en matière scientifique. À la fin des années 1970, son attention se tourne vers les politiques industrielles en préconisant une ‘politique transformative’ nationaliste se justifiant par la défense de la « souveraineté technologique ». L’analyse de ses recherches et recommandations, et des controverses suscitées, révèle que la lutte du Conseil contre les nouvelles tendances politiques s’effectue en parallèle aux transformations des perceptions publiques concernant la fonction sociale du gouvernement canadien. Sa dissolution en 1992 symbolise la réorientation d’une approche aux politiques privilégiant la direction de l’État vers celle du

1. I want to thank Steven Turner for suggesting the Science Council as a research topic and for his comments on earlier drafts of this paper. I also wish to express gratitude to editor Philip Enros and the anonymous reviewer for their insightful comments.

marché. Cet article examine la philosophie du Conseil et son histoire au sein de deux contextes plus larges: le débat politique concernant le continentalisme canadien et l'évolution conceptuelle de la science, la technologie et l'innovation et de leurs perspectives futures.

The formation of the Science Council of Canada (SCC) in the mid-1960s was an important step in the institutionalization of a policy for science attuned to the idea of technological sovereignty, an idea that acknowledged the new importance of national science in the postwar, Cold War world, and the accepted need for state steering of science and technology. This paradigm for the funding and management of S&T—dominant in Canada by the early 1950s—impelled heavy government involvement at various stages in the innovation process. The SCC, in its mandated role as an ‘arms-length’ agency providing independent advice, forcefully advocated such involvement in its official reports delivered to the federal government and simultaneously released to the public. It steadily exhorted successive governments to develop an integrated national strategy for Canada.

During the early 1980s the SCC drew strong opposition from critics, who characterized its recommendations for industrial policy as interventionist and as driven by ‘economic nationalism.’ In the wider context, economic and political developments in the 1970s and early 1980s sorely tested faith in the wisdom and efficacy of a policy for science aimed at the goal of technological sovereignty. By the early 1990s that strategy gave way to a new paradigm and a new policy direction for funding and managing science and technology. The new paradigm strongly emphasized the commercialization of S&T, and between 1985 and 1992—well before the SCC was dissolved—a new science policy apparatus had been created to align with that emphasis. Though the Council mounted a late attempt to adjust to the new policy tides, political commitment to the ideals of technological sovereignty was already disintegrating by the mid-1980s. The dissolution of the Science Council in the 1992 federal budget after more than twenty-five years of operation was thus a significant milestone in the evolution of science policy in Canada: its decline and eventual demise coincided with the rise of neoliberal political philosophy in Canada, and with a growing drive to continentalism. In this sense the decision to dissolve the SCC was part of a pivotal shift to a more global, neoliberal, and market-oriented political approach to science and technology decision-making. More, the Science Council’s demise symbolized the disintegration of a gradually-forged but deeply-rooted postwar consensus concerning science, the nation, and the role of government.

This article reviews the guiding philosophy of the Council and discusses the Council's history within two larger contexts: that of the Canadian political debate over continentalism and that of evolving patterns of thought about science, technology, and innovation, and how they might be managed. The Science Council addressed a wide array of issues in Canadian science and technology during its mandate, but its move into the area of industrial policy embroiled it in national debates over free trade and the economy. Although this paper deals mainly with the dissolution of the SCC and with the controversy over industrial policy that set the stage for that dissolution, it also offers a retrospective account of the Council's founding and early years, the better to elucidate the paradigm for a national policy for science that the SCC defended until the end.

Science and 'Science Policy' in Canada, 1940-1960

For Canada, as for most western countries, the Second World War marked a turning point in the perceived role of science and technology in the national life. The shared struggle of the war experience—and the Cold War that followed—had profound effects on the conduct, development, and state-funding of Canadian national science. The war had forged lines of comradeship, communication, and influence at the senior levels of academic, industrial, and government science, and between Canada and her allies as well. Atkinson-Grosjean describes the story of Canadian science policy in the immediate postwar period particularly as “very much the enterprise of a small elite group of men from similar socio-economic backgrounds who held interlocking positions of power.”² This was undoubtedly the case with the Science Council's first chairman, O.M. Solandt. Solandt had been involved in operational research during the war, became chairman of the peacetime Defense Research Board (1947-56), headed R&D for the next seven years with the Canadian National Railways, and was vice-president of R&D for both de Havilland Aircraft of Canada Limited and Hawker Siddeley Canada Ltd. from 1963-1966.³ Many in this ‘small, elite group of men’ were associated with Canada's preeminent scientific institution, the National Research Council. Created in 1916 to advise government and coordinate national scientific efforts, the NRC had expanded its mandate in the inter-war period to include a network of prestigious laboratories and the providing of research grants to

2. Janet Atkinson-Grosjean, *Public Science, Private Interests: Culture and Commerce in Canada's Networks of Centers of Excellence* (Toronto: University of Toronto Press, 2006), 40-41.

3. G. Bruce Doern, *Science and Politics in Canada* (Toronto: McGill-Queen's University Press, 1972), 91.

university researchers.⁴ Despite the NRC's putative mandate to coordinate government scientific activity, no formal science policy was articulated as such during the period from 1945 to 1960; rather, science and technology issues were dealt with on a piecemeal basis as cost pressures competed with efforts at rationalization and planning.

The Second World War had given Canada's scientists the opportunity to work at the cutting edge of basic advances in scientific knowledge with British and American colleagues. The Cold War—and a desire to maintain prestige with allies—helped spur efforts to maintain this momentum. It was natural, therefore, that policies for science in Canada after 1945 were shaped by awareness of other national policy models, especially American and British. The linear model of innovation, often attributed to Vannevar Bush, head of the US wartime Office of Scientific Research and Development and primary coordinator of the Manhattan Project, proved particularly alluring.⁵ Bush emphasized the importance of basic research in 'priming the pump' at one end of the innovation 'pipeline'; fundamental discoveries then move through various stages of development and emerge as practical applications at the far end. Since the private sector could be expected to under-invest in basic science, it was the responsibility of the federal government to provide this investment, now recognized as a public good. Because fundamental breakthroughs could neither be foreseen nor, it seemed, their course steered by policy, the state's role is to provide funds 'on faith' to scientists, in order to prime the pipeline that would generate social and economic returns from discoveries. The special responsibility for priming, however, did not preclude the necessity for heavy government funding and policy-steering at other stages of the linear innovation process, whether through procurement, direct stimulus to industrial R&D, or 'Big Science' projects of national importance beyond the scope of the private sector.

Versions of the linear model dominated Canadian postwar policy for science, usually as a set of implicit assumptions. The model had found its prototype in the Manhattan Project, and Canada's role in the success of that endeavor was significant.⁶ Canada possessed uranium in abundance and in the postwar period Canadian scientists established a world-wide reputation for both pure and applied nuclear physics at the Chalk River

4. Donald Phillipson, "The National Research Council of Canada: Its Historiography, its Chronology, its Bibliography," *Scientia Canadensis* 15, 2 (1991): 177-193.

5. For a discussion of the murky origins of the linear model see Benoît Godin, "The Linear Model of Innovation: The Historical Construction of an Analytical Framework," *Science, Technology, & Human Values* 31, 6 (2006): 639-667.

6. Senate of Canada, *A Science Policy for Canada*, Report of the Special Senate Committee on Science Policy, vol. 1, "A Critical Review: Past and Present" (Ottawa: Queen's Printer for Canada, 1970), 72.

facility, organized in the mid-forties as part of the secret UK-Canada atomic energy project.⁷ The 1951 Massey Commission, in its comments on the organization and distribution of Canada's R&D effort, invoked the pipeline metaphor through its emphasis on the importance of fundamental research (explicit in the linear model); the model had clearly gained currency in Canada by 1951.⁸ Canada further prioritized basic research by increasing funding to academic researchers in universities. It did so primarily through the NRC, which expanded its pre-war practice of disbursing funds to individual academic scientists in response to research applications.⁹

Federal government expenditures on science escalated sharply after 1945 and, in step with growth in Canada's population and GDP, positively soared after 1950. Gross R&D expenditures (GERD) of \$5 million in 1939 (roughly .086 percent of GDP) rose to about \$80 million by 1947, but by 1960 had swelled to over \$300 million (roughly .76 percent of GDP).¹⁰ The Massey Commission's report reflected the growing sense that if basic science could only be encouraged, its applications could be, *had* to be, planned and controlled, by the state and in the national interest. In the 1950s a renewed attempt was made to do so through state-managed and -funded 'Big Science' projects such as the development of nuclear energy and military aircraft. In 1952, for instance, the atomic energy project, a division of the NRC from 1944, became a separate crown corporation, Atomic Energy of Canada Ltd. (AECL).¹¹ Yet 'pure' science was still prioritized: the Cold War was in full swing by 1957 and the 'Sputnik shock' further induced government to increase funding for science. The rapid expansion of the university system in the late 1950s proceeded in tandem with this development: between 1946 and 1961 the number of NRC scholarships for university research tripled.¹²

Much of the shaping of science policy through 'Big Science' by the St. Laurent and Diefenbaker governments during the 1950s was centered on projects inclined not to fostering industry directly but instead undertaken in the name of self-sufficiency, or of national security and prestige.

7. G. Bruce Doern, *Science and Politics*, 109, 113.

8. Atkinson-Grosjean, *Public Science*, 43; Massey Commission, "Chapter 14. Scientific Research Under the Federal Government," in *Canada, Royal Commission on National Development in the Arts, Letters & Sciences, Report, 1949-1951* (Ottawa: King's Printer, 1951), 167.

9. G. Bruce Doern, *Science and Politics*, 101.

10. Senate of Canada, *A Science Policy for Canada*, vol. 1, 64; John de la Mothe and Gilles Paquet (Program of Research in International Management and Economy—PRIME) "Circumstantial Evidence: A Note on Science Policy in Canada," *Working Paper* (University of Ottawa, Faculty of Administration) 94, 20 (1994): 1-18; Statistics Canada, "Historical Statistical Supplement," *Canadian Economic Observer* vol. 1, 11-210 (1988): 1-104.

11. Phillipson, 180.

12. *Ibid.*, 182.

Examples include atomic energy, the US-Canadian Pinetree Line (completed in 1954), and Canada's ambitious CF-105 supersonic interceptor jet (the Avro Arrow). These emerged from an increasingly nervous Cold War climate that made Canada's participation in such continental enterprises—and in the science and technology they relied on—seem imperative. Yet this was an era of optimism as well, one of rising budgets and rising hopes. A popular expression of the elevated importance and prestige of science in the national life was published by *Time* magazine—widely circulated in Canada—in January of 1961.¹³ *Time* chose fifteen scientists as its 'men of the year,' and intoned that "statesmen and savants, builders and even priests, are their servants [...] science is at the apogee of its power."¹⁴ *Time*'s hyperbolic use of the term 'servants' notwithstanding, the growing reliance on and enthusiasm for S&T as the vehicle for social, economic, and diplomatic health, and the increasing integration of the Canadian and US economies, were tempered by a nascent Canadian nationalism anxious about the effects of American economic and cultural influence and the distinctness of Canadian identity.¹⁵

The Second World War and its aftermath consolidated the philosophy that the federal government should financially force-feed the scientific endeavor. Its attempts to do so, however, had resulted in a research landscape that had become an eclectic mix of far-flung research facilities, labs, networks, and initiatives, all dependent in the main on federal research money, most of which flowed through the NRC.¹⁶ Yet the NRC labored under the tension created between its coordinating role and its role as a government agency operating its own labs; a second, related tension grew from competing with labs in universities and government for the same pool of funding.¹⁷ The advisory and coordination functions suffered particularly, and by the 1950s the NRC was coming under criticism by elements in Canada which were convinced it was unable to perform all of its functions effectively. A scientific panel created to advise the (1944) Privy Council Committee on Scientific and Industrial Research (PCCSIR) aimed to address the problem of coordination, but the PCCSIR did not

13. Robert T. Elson and Duncan Norton-Taylor, *The World of Time Inc., The Intimate History of a Publishing Enterprise, Volume 2, 1941-1960* (New York: Atheneum, 1973), 88-89.

14. Godfrey Hodgson, *America in Our Time* (New York: Doubleday & Company, Inc., 1976), 6.

15. Consult *Report of the Royal Commission on Canada's Economic Prospects* (Ottawa: Queen's Printer, 1957).

16. M. Christine King, *E.W.R. Steacie and Science in Canada* (Toronto: University of Toronto Press, 1989), 72-76.

17. De la Mothe and Paquet, "Circumstantial," 5; David Holdsworth, "Science, Politics, and Science Policy in Canada: Steps Toward a Renewed Critical Inquiry," *Journal of Canadian Studies* 37, 3 (2002): 14-32.

even meet in the 1950s.¹⁸ Concern over the substantial and rising volume of expenditure stimulated appeals for more and better policy-for-science. Those calls, combined with the conviction that the NRC was no longer up to the task of coordinating Canadian scientific activity, helped inaugurate the era of formal science policy in Canada in the 1960s.

Formal Science Policy and the Founding of the SCC

Atkinson-Grosjean argues that “international ideas” about science and the economy circulate first in “epistemic communities’ of policy professionals” in organizations such as the OECD.¹⁹ In 1959 that body developed an interest in national science policies, and published international comparisons of national science efforts for the first time in 1963.²⁰ A formal outcome of this influence in Canada was the 1960 establishment of the Royal Commission on Government Organization (Glassco Commission), which examined Canada’s research efforts as a ‘special area of administration.’

Many of the Glassco Commission’s comments were critical of the NRC and government research operations in general, and its report sent transformative ripples through the bureaucracy of the Canadian government.²¹ It suggested that the machinery for advising the Prime Minister and Cabinet had been “virtually inoperative,” and that government science activities were growing in a piecemeal manner without sufficient coordination.²² It recommended the appointment of a single minister for science and technology and the establishment of a special science secretariat to advise that Minister. It also envisioned participation on the part of Canadians from outside government and recommended a national Scientific Advisory Council be formed as a way to engage public input. This last idea later found renewed expression in the organization of the SCC: from its 1966 inception, its membership included non-government representatives. The second recommendation led to the 1964 creation of the Science Secretariat. The Secretariat was to provide day-to-day support to the PCCSIR and was to be a small fact-finding group, operating without executive authority but close to the center of power, designed to assemble and analyze information on government science activities for presentation to the Prime Minister and Cabinet.

18. De la Mothe and Paquet, “Circumstantial,” 5.

19. Atkinson-Grosjean, *Public Science*, 35.

20. Senate of Canada, *A Science Policy for Canada*, vol. 1, 89.

21. *Ibid.*, 91.

22. Glassco Commission, *Report of the Royal Commission on Government Organization*, vol. 4, “Special Areas of Administration” (Ottawa: Queen’s Printer, 1963), 218.

The 1967 Senate Special Committee on Science Policy (Lamontagne Commission) also looms large in the science, economic and social policy debates of the 1960s and 1970s. Initiated by Senator Maurice Lamontagne (1917-1983) and tasked with appraising federal science policy in “the new scientific age,” it was an early manifestation of the renewed pressure for rationalization and coordination of government S&T activity.²³ It sought to determine “a dynamic and efficient science policy for Canada.”²⁴ Volume One of its Report, “A Critical Review: Past and Present” (1970), criticized the distribution of expenditures on R&D (it found more emphasis on applied research was needed to “bridge the gap between science and industry”),²⁵ and voiced the by-then-familiar complaint that research activities in Canada were “fragmented and uncoordinated.”²⁶ The Lamontagne Commission conceived of a policy for science that envisioned a strong role for government in the management of S&T; a significant outcome of the Report was the realization of the Glassco Commission’s first recommendation—the creation of a Ministry of State for Science and Technology (MoSST)—in 1971. This effectively replaced the Science Secretariat.²⁷

Among the welter of new institutions created in the course of this national science policy debate, the most important was arguably the Science Council of Canada. Created in 1966 by the Liberal government of Prime Minister Lester Pearson, it was intended to realize the recommendation of the Glassco Commission that a national Scientific Advisory Council be formed as a way to engage public input about science and science policy. The first meeting of the SCC was held in Ottawa and was opened by Prime Minister Pearson.²⁸ Pearson appointed Dr. O.M. Solandt as its first chairman. Solandt, by virtue of his impressive credentials and career, as well as his personal relationship with Pearson and many leaders in industry, brought both prestige to the Council and key exposure and representation to political circles.²⁹ Bruce Doern observes that Solandt’s organizational ideology was “clearly mission-oriented,” and that this philosophy infused the work of the Science Council.³⁰ Initially, the

23. Senate of Canada, *A Science Policy for Canada*, vol. 1, 1.

24. *Ibidem*.

25. Atkinson-Grosjean, *Public Science*, 46.

26. Senate of Canada, *A Science Policy for Canada*, vol. 1, 190.

27. Atkinson-Grosjean, *Public Science*, 46.

28. David Spurgeon, “PM Praises Objectives of New Science Council,” *The Globe and Mail*, 6 July 1966, 37.

29. John de la Mothe, “A Dollar Short and a Day Late: A Note on the Demise of The Science Council of Canada,” *Queens Quarterly* 99, 4 (1992): 873-886.

30. G. Bruce Doern, “The Science Council of Canada,” in *The Structures of Policy-Making in Canada*, ed. G. Bruce Doern and Peter Aucoin (Toronto: The Macmillan Company of Canada Limited, 1971), 93-94.

Science Secretariat and the SCC worked together—the Secretariat served as the Council’s staff support—but the SCC acquired its own staff when it became a crown corporation in late 1968.³¹

The Work and Early Years of the Science Council

The Science Council’s core mandate strongly resembled that of the NRC’s in terms of its advisory function. It was mandated to assess and monitor the resources, adequacy, and requirements of Canadian science and technology, to engage in both current and long-range planning, and to provide policy advice to the government on science and technology issues (it was also mandated to raise public awareness of such issues).³² The Council was initially comprised of twenty-five individuals, some from government (including deputy Ministers and assistant deputy Ministers), and unsalaried representatives from business and the scientific community; only the chairman’s was a paid position. Later, only non-government representatives were appointed (up to thirty), and these were chosen to represent a broad cross-section of the Canadian scientific and business community. It was conceived as independent from government and it chose its research projects and focus independently, a feature emphasized as crucial to its mandate. This reflected the Glassco Commission’s concern about the NRC’s adequacy as an advisory mechanism for the development of Canadian S&T. The Council was not viewed by bureaucrats as a coordinating body for the national effort, however, and its private-sector membership left it open to later charges that it operated as a ‘lobbying group’ for scientists and engineers.

The Science Council began its work enthusiastically. Provided with an initial budget of just \$0.8 million, by the end of its third year the SCC had produced four major Reports dealing with issues of contemporary relevance: the space program, a proposal for an intense neutron generator, and water resource research.³³ *Report No. 4 Towards a National Science Policy in Canada* (1968) reveals that the Council’s approach was set early on. There, it explicitly yoked science and technology to national goals: “it is the opinion of the Science Council that the application of science and technology will make significant contributions to the solution of economic and social problems in Canada and in so doing will contribute to the realization of the goals of the nation.”³⁴ Having so linked S&T to national

31. Doern, *Science and Politics*, 77.

32. Science Council of Canada Act, 1966-67, c. 19 as amended by 1968-69, c. 28. Cited in Science Council of Canada, *Annual Report, 1977-78* (Ottawa: Minister of Supply and Services, 1978), 16; Doern, *Science and Politics*, 11.

33. Science Council of Canada, *Annual Report, 1977-78*, 16.

34. Science Council of Canada, *Report No. 4, Towards a National Science Policy for Canada* (Ottawa: Minister of Supply and Services, 1968), 1.

goals, the Council proceeded to broadly define those goals and gave recommendations on how to achieve them. It advocated “comprehensive, mission-oriented ‘major programs’ be set up to coordinate the efforts of all sectors of the economy” and generate solutions to “important national problems.”³⁵ Though it took pains to pay homage to the importance of basic research—it recommended its expansion—the Council invoked criticism of the NRC as too focused on pure science at the expense of industrial research: it noted that “Canada has in the past tended to support research but to neglect development and innovation.”³⁶ Further, it envisioned the government’s role as “predominantly that of initiator, coordinator and provider of funds for much of the research and development.” And it was doubtless urging at least partial transfer of R&D from the NRC into industry (and the universities) when it added that “other sectors would be mainly performers of research and innovation.”³⁷

During the decade of the 1970s contending views about the role of government—and of the NRC—in the scientific endeavor often came to bear on the important issues of government industrial strategy and policy. As Canada’s GERD tripled between 1960 and 1970 (to one billion dollars), this debate intensified. It occurred, moreover, in the context of a burgeoning Canadian nationalism. The issue of foreign ownership, particularly of Canadian industry and manufacturing, became a touchstone for Canadian nationalists such as Liberal Finance Minister Walter Gordon, who successfully lobbied in 1967 for a task force to study its effects. In 1972, Canadian nationalism—and the debate on industrial strategy—gained momentum from the Trudeau government’s commitment to a ‘third option’ for Canada-US relations that rejected both the status quo and closer integration with the US. The Trudeau Government favoured instead a policy of international diversification combined with an industrial strategy that emphasized specialization and Canadian ownership.³⁸ Trudeau’s administration enacted several nationalist proposals: the Canadian Development Corporation (1971) was created to encourage Canadian ownership and management through investment capital, and in 1973 the recommendations of the Gray Report (1972) found legislative expression in the establishment of the Foreign Investment Review Agency (FIRA). FIRA was to screen foreign investment in and takeovers of Canadian businesses.

35. Science Council of Canada, *Towards a National Science Policy for Canada*, 1.

36. *Ibid.*, 4.

37. *Ibid.*, 2.

38. Margaret Conrad and Alvin Finkel, *History of the Canadian Peoples, Volume II, 1867 to the Present*, 4th ed. (Toronto: Pearson Education Inc., 2006), 359-360; Norman Hillmer, “The Third Option,” in *The Canadian Encyclopedia*, <http://www.thecanadianencyclopedia.com/index.cfm?PgNm=TCE&Params=A1ARTA0007956>, accessed 25 May 2011.

It was criticized by nationalists because it approved most of the applications it reviewed; anti-nationalists argued this was economic nationalism—an “emotional reaction”—and emphasized the benefits of “free and unhampered” trade.³⁹

Yet the raging debate over foreign ownership was only one aspect of 1970s political and economic turbulence that would spill over into science policy. The 1973 oil shocks, combined with newly restrictive US trade policies, stagflation, a wide-spread productivity slowdown, and growing structural unemployment, induced economic contractions throughout the industrialized world and the advent of ‘tight money’ policies in Canada.⁴⁰ And over the next fifteen years the advancing environmental movement was reinforced by disasters at Three Mile Island (1979), Bhopal (1984), and Chernobyl (1986) that underlined the difficulty of controlling technology. The economic developments furthered a breakdown in the “postwar compromise” between business, labour, and government that had underwritten the prosperity of the previous three decades.⁴¹ The shift in public attitude placed added pressure on governments to explain and justify the flow of funding to S&T, and increased demands for government rationalization and coordination of scientific and technological activity.

Canadian Nationalism, Industrial Policy, and the Work of the Science Council

The 1968 transformation of the SCC into a crown corporation gave it control over its own budget and expanded its research potential. During the 1970s the Council communed with the swell of nationalism in Canada and echoed nationalists’ concerns about the effects of foreign ownership on Canadian industry. It addressed a wide array of often controversial issues in Canadian science and science policy during its tenure. Initially, Science Council study committees concentrated on documenting the state of science and technology and S&T policy, and sought to decipher the connections between science and technology, R&D, and the impediments to industrial innovation. In its early years the Council studied problems of urbanization and population growth and in the middle years Council studies focused on the north, education, and the energy crisis of the 1970s. In these areas the SCC gave a scientific focus to contemporary political interests; later, it examined the potential and impact of emerging technologies such as

39. Conrad and Finkel, 359.

40. *Ibid.*, 378.

41. Gregory Inwood, *Continentalizing Canada: The Politics and Legacy of the Macdonald Royal Commission* (Toronto: University of Toronto Press, 2005), 7-10; John F. Conway, “Reflections on Canada in the Year 1994,” *Canadian Issues* 17 (1995): 145-171; Conrad and Finkel, 433-436; Kenneth Norrie and Douglas Owram, *A History of the Canadian Economy* (Toronto: Harcourt Brace & Company Canada, Ltd., 1996), 437.

computers and biotechnology.⁴² From 1967, the Council struck committees and commissioned background studies that provided information or research data later incorporated into official reports. These were simultaneously submitted to Cabinet and disseminated to the public, and they carried the Council's full sanction.

In the early 1970s the SCC produced a spate of background studies focused on the problems facing Canadian industry and manufacturing. *Prospects for Scientists and Engineers in Canada* (1971) found a forty percent decline in job offers for technical graduates for 1969-70, and argued that more industrial development would have translated into more demand for these workers.⁴³ *The Multinational Firm, Foreign Direct Investment, and Canadian Science Policy* (1971), and *Innovation and the Structure of Canadian Industry* (1972) drew causal lines between foreign ownership, industrial 'truncation,' and reduced employment prospects. 'Truncation' was identified as a persistent, structural problem: Canada's industrial economy was dominated by branch plants of foreign multinationals, whose investment in R&D, and in management and marketing, was made outside of Canada. Truncation worked against development of the industrial R&D infrastructure in Canada that the SCC deemed essential to a modern nation. Later, *Uncertain Prospects: Canadian Manufacturing Industry 1971-1977* (1977), suggested that developments such as the 1976 election of the Parti Québécois in Quebec and a sluggish mid-1970s economy had produced a "climate of uncertainty" that exacerbated the problems of Canadian manufacturing.⁴⁴ All of these studies engaged the debate on the health of Canadian industry, but the real trouble for the Science Council began in 1978 with its move into the areas of industrial policy, technology, and the economy.

The most controversial example of the Council's 'new' direction was the study, *The Weakest Link: A Technological Perspective on Canadian Industrial Underdevelopment* (1978), and its corresponding official policy report, *Forging the Links: A Technology Policy for Canada* (1979). The first was a substantial piece of research, comprised of over two hundred pages and sixty tables and figures; the latter drew on the findings of the background studies listed above, and constituted the Council's manifesto detailing its views on Canadian industry and industrial strategy. The study and report, intended to "form the initial stage of a major prescriptive program," compared Canada to underdeveloped countries whose resource

42. For a comprehensive thematic and categorical survey of SCC publications see Brian Wilks, "The Science Council of Canada," in *Browsing Science Research at the Federal Level in Canada* (Toronto: University of Toronto Press, 2004).

43. Frank Kelly, *Prospects for Scientists and Engineers in Canada*, Science Council of Canada (Ottawa: Information Canada, 1971), 43.

44. Science Council of Canada, *Uncertain Prospects: Canadian Manufacturing Industry 1971-1977, A Statement* (Ottawa: Minister of Supply and Services Canada, 1977), 1.

abundance had been exploited by advanced, industrialized nations.⁴⁵ It alleged that while the industrial policies of successive governments had addressed the *symptoms* of industrial decline—unemployment, the balance of payments, low productivity, and so on—no attempt had been made to address underlying *structural* causes. The study focused on the high degree of foreign ownership, the lack of sufficiently concentrated markets, and the ‘behaviour’ of multinational corporations in Canada: “the way firms of foreign origin ha[d] been permitted to operate.”⁴⁶ Government policies, the study charged, were “based on the assumption that Canada was an industrially strong country,” yet “*contrary to what many people believe, Canada does not have the economic structure of an industrialized country.*”⁴⁷

Provocatively, the Council had in effect labeled Canada a ‘third world’ country. The Council pointed to the truncation of Canadian industry, and argued such long-term structural problems left only relatively low-skilled, waged labor and the extraction of resources as Canada’s economic ‘part to play.’ The Council held successive governments responsible for placing control of economic development of manufacturing “in the hands of overseas sellers of technology”; it therefore wanted the present government to intervene to control these practices.⁴⁸ In essence, the Council wanted the Trudeau government to force multinationals to be committed to the principle of Canadian national development, rather than just the imperatives of the capitalist marketplace.

The Council offered a number of solutions to truncation. It called again for “multidisciplinary, mission-oriented projects in which all sectors can participate,” and for the centralization of decision-making for industrial policy.⁴⁹ It added that “Canada should reserve strategic areas for Canadians” and that strong industries could be created “through the purchasing power of the public sector.”⁵⁰ Also recommended was the establishment of public-private partnerships or public corporations to facilitate industrial development, and strong government participation to assist industries “operating on a low or non-profit basis.”⁵¹ And to make

45. John N.H. Britton and James M. Gilmore, *The Weakest Link: A Technological Perspective on Canadian Industrial Underdevelopment*, Science Council of Canada Background, Study no. 43 (Ottawa: Minister of Supply and Services Canada, 1978), 52.

46. *Ibidem*.

47. Science Council of Canada, *Report No. 29, Forging the Links: A Technology Policy for Canada* (Ottawa: Minister of Supply and Services, 1979), 20, 28. Emphasis in the original.

48. *Ibid.*, 141.

49. Science Council of Canada, *Annual Report, 1976-77* (Ottawa: Minister of Supply and Services, 1977), 36.

50. *Ibid.*, 35-36.

51. *Ibid.*, 28.

government responsibility explicit, the Council urged that the Foreign Investment Review Agency (FIRA) be strengthened in order to regulate importation of foreign technology and encourage Canada's indigenous R&D capacity.

The Science Council's long-range cure for the ills of the branch-plant economy—what it termed the long-term 'deindustrialization' of Canada—was the adoption of the umbrella theme of technological sovereignty, which it defined as "the ability to *develop* and *control* the technological capability necessary to insure [a nation's] economic, and thence its political, self-determination."⁵² In *Forging* the Council recommended broad policy objectives as a development strategy to achieve this goal: expanding demand for indigenous technology and the country's capacity to develop technology, among others.⁵³ In practical terms, this meant initiatives directed at encouraging Canadian industry through full implementation of a 'Buy Canada' program (even if at higher cost), improved financial support for R&D in industry and technology, government procurement programs, privileged tax breaks, grants, and so on, for Canadian-owned firms. A key recommendation revolved around the notion of core companies: starting from the premise that in Canada and elsewhere governments already played a large role in the economy, the SCC urged the creation and fostering of what would become the "core companies of the economy."⁵⁴ Core companies would result from the merger of a number of Canadian manufacturers, be Canadian controlled, and be endowed with sufficient "industrial and technological strength to act as lead firms for a whole subindustry of smaller companies."⁵⁵

The Council here offered its nationalistic rationale for the 'sudden' focus on industrial strategy: "the advocacy of an industrial strategy has a fundamental social purpose—ensuring the future prosperity of Canadians."⁵⁶ Declining prosperity was a dominant worry after the mid-1970s and the SCC aligned with majority concerns regarding Canada's unhealthy dependence on staple exports and optimism for the ameliorative potential of a technology-based industrial strategy. It differed in that it viewed growing policy attention to an improved balance of payments, increased employment, and infusions of foreign capital, as focused on short-term economic gain at the expense of indigenous—particularly scientific and technological—development.

52. Josef Kates, "Technological Sovereignty: A Strategy for Canada," in *Science Council of Canada Eleventh Annual Report, 1976-77* (Ottawa: Information Canada, 1977), 26.

53. Science Council of Canada, *Forging the Links*, 48.

54. *Ibid.*, 54.

55. *Ibid.*, 51.

56. *Ibid.*, 46.

By the early 1980s a battle was developing that pitted the Council's theme of technological sovereignty against the theme of free, or freer trade. At first this theme was advocated mainly by free-market economists, but by 1983, it was being taken up by the Trudeau government bureaucrats and policy-makers as well.⁵⁷ A narrow defeat at the polls in the 1979 election had turned to another Liberal majority government in 1980, but nationalistic initiatives such as FIRA and Trudeau's National Energy Policy (NEP) conflicted with growing US protectionism. Increasingly, the nationalistic impulse in Canada competed with a growing drive to continentalism.

The SCC and its Critics: Challenging Technological Sovereignty

The SCC's move into industrial policy and the economy drew strong criticism, especially from mainstream economists, who challenged the Council's involvement in this area generally, and attacked the interventionist nature of the recommendations in *Forging the Links*. Essentially, the Report had advanced the idea that the high level of duty-free imports meant a "lack of demand 'pull'" for Canadian industrial technology, and this, combined with a high degree of foreign ownership, had prevented the nation from living up to its anticipated development potential.⁵⁸ Economists such as Kristian Palda—fellow of the Fraser Institute and professor of Business Economics at Queen's University—challenged the conclusion that foreign ownership inhibited the development of domestic technological development. Palda argued instead that "foreign-owned firms actually spend more on R&D than Canadian-owned firms."⁵⁹ University of Toronto economist A.E. Safarian contended high foreign ownership was the outcome rather than the cause of industrial decline, tied this to "the inefficiency of markets," and was apprehensive that the Council's proposals called for "substantial and direct intervention."⁶⁰

Palda challenged the SCC throughout its tenure, and he was eager to offer his critique of *The Weakest Link*: he published his book, *The Science Council's Weakest Link: A Critique of the Science Council's Technocratic Industrial Strategy for Canada* (1979), within a month of the release of the Council's official report. Palda asked why the SCC was involving itself in industrial policy in the first place since, he maintained, this was not specifically part of its mandate; he answered that "technological

57. Inwood, *Continentalizing Canada*, 7, 40.

58. Science Council of Canada, *Forging the Links*, 20.

59. Kristian Palda, *The Science Council's Weakest Link: A Critique of the Science Council's Technocratic Industrial Strategy for Canada* (Vancouver: The Fraser Institute, 1979), x.

60. A.E. Safarian, "Foreign Ownership and Industrial Behaviour: A Comment on 'The Weakest Link'," *Canadian Public Policy* 5, 3 (1979): 318-335.

sovereignty is clearly an aspect of economic nationalism.”⁶¹ Interventionist policies, he added, meant increased taxes and unit costs, and thus decreased the real income of workers and consumers.⁶² Palda (and other mainstream economists) questioned the Council’s methodology and motivation. They protested the study was “based on incomplete and unscientific research,”⁶³ and added a charge that became familiar in discussions of the Science Council: that it had become a lobbying group “motivated by the desire to create more jobs for scientists and engineers.”⁶⁴ Palda’s was an early voice in the Canadian rendition of a neoliberal chorus: like many continentalists, he saw the only legitimate role for the central government in the economy as that of creating a ‘climate of certainty,’ mainly through controlling inflation. This outlook became increasingly widespread throughout the 1980s as economic competition from American and major OECD trading partners was making it increasingly difficult for Canada to pursue the sort of nationalistic economic policies that the SCC favoured. By the late 1980s that approach threatened to isolate the Canadian economy. Governments and economists alike, in the name of deficit reduction and job creation—and pressured by the new economic realities—grew more attracted to continentalism and the rule of the market.

The Science Council, meanwhile, stayed true to its policy recommendations. Between 1982 and 1985 it championed the idea that the federal government could ‘pick winners.’ Extending the core companies theme, it recommended the government identify “threshold firms” on the verge of rapid expansion that only needed a ‘helping hand’ to realize their full potential.⁶⁵ These would be large, Canadian-owned, preferably high-tech firms that would then coordinate horizontally and vertically with smaller firms in ancillary industries, thus completing a chain to resource industries, innovation, marketing, and implicitly, to Canadian scientific and technologi-

61. Palda, *The Science Council’s Weakest Link*, 7.

62. *Ibidem*.

63. Michael Walker, “Preface,” in Palda, *Weakest Link*. For similar contemporaneous views see Economic Council of Canada, *Looking Outward: A New Trade Strategy for Canada* (Ottawa: Minister of Supply and Services, 1978). For a series of articles and commentary discussing trade and technology and policy and both promoting and opposing the SCC’s views on industrial strategy see *Canadian Public Policy* 4, 4 (1978): 1-154; *Canadian Public Policy* 5, 3 (1979): 304-462.

64. Palda, *The Science Council’s Weakest Link*, 44. See also Steven Globerman, “Canadian Science Policy and Technological Sovereignty,” *Canadian Public Policy* 4, 1 (1978): 34-45.

65. Guy P.F. Steed, *Threshold Firms: Backing Canada’s Winners*, Science Council of Canada Background, Study no. 48 (Ottawa: Minister of Supply and Services, 1982), 16; Science Council of Canada, *Gearing Up For Global Markets: From Industry Challenge to Industry Commitment, A Statement* (Ottawa: Minister of Supply and Services, 1988), 4. For a contemporaneous opposing view, see Roy George, *Targeting High-Growth Industry: A Consideration of the Advantages and Disadvantages of Adopting Such an Industrial Strategy in Canada* (Montreal: The Institute for Research on Public Policy, 1983).

cal talent. The Council remained unfazed by the retort that ‘picking winners’ would require the government to exercise high-level business management skills, market acumen, and technical know-how of the sort deemed challenging for even the most talented CEOs in the world of commerce.

The recessionary cycles that began in 1980 increased the tension in the battle over free trade, and further intensified the contention over an industrial strategy for Canada. The Science Council—still advocating an interventionist-style policy for science—saw Canadian industry as too vulnerable to withstand the wave of trade liberalization that would accompany an expansion of free trade. Indeed, it argued that in terms of the percentage of duty-free imports permitted, Canada “already [led] the industrialized world as a practitioner of free trade.”⁶⁶ It contrasted the Canadian government’s role in this regard with the attitudes of “many foreign governments (particularly in Europe and the Far East)” who were “not the least reluctant to intervene directly and comprehensively in their economies on behalf of domestic industry.”⁶⁷ But many in the Canadian government seemed bent on continental free-trade: in 1983 the Trudeau government announced its intention to pursue sectoral free trade arrangements with the US as part of Canadian efforts to resolve conflict over the NEP and FIRA.⁶⁸ The change to a Conservative government following the 1984 election accelerated this trend, and key studies in the mid-1980s provided a basis for a fundamental policy reorientation toward North American free trade.

The 1980s: Deregulation, Privatization, and Trade Liberalization

One such study was the Ministerial Task Force on Program Review (Nielsen Report), billed as the most comprehensive review of government programs ever undertaken in Canada. It was one of the first items on the agenda of the newly-elected Mulroney Conservatives. Nineteen study teams—composed of a mix of private and public sector individuals—reviewed 989 government programs representing expenditures of \$92 billion. Its significance has largely been overlooked by historians, perhaps because it did not lead directly to deep cuts in programs and personnel as was expected.⁶⁹ Led by Deputy Prime Minister Erik Nielsen and three of

66. Science Council of Canada, *Forging the Links*, 36.

67. *Ibid.*, 21.

68. G. Bruce Doern and Brian W. Tomlin, *Faith and Fear: The Free Trade Story* (Toronto: Stoddart Publishing Co. Limited, 1991), 20-21.

69. David Johnson, *Thinking Government: Ideas, Policies, Institutions, and Public-Sector Management in Canada* (Peterborough: Broadview Press, Ltd. 2002), 432; Gregory Inwood, *Understanding Canadian Public Administration: An Introduction to Theory and Practice* (Toronto: Prentice Hall Allyn and Bacon Canada, 1999), 292-293; Donald Savoie, *Thatcher, Reagan, Mulroney: In Search of a New Bureaucracy* (Pittsburgh: University of Pittsburgh Press, 1994), 130.

the most senior members of the Mulroney government, its stated purpose was to ensure “better service to the public and improved management of government programs.”⁷⁰ Broadly speaking, however, the Report represented the first tentative steps in a policy reorientation that reflected the ascendancy of market-oriented models. It sought to inject the principles of New Public Management (NPM) into the bureaucracy: more businesslike management techniques, simplification of government mechanisms, and a focus on privatization, deregulation, and contracting out of public services.⁷¹ Indeed, the task force was placed under the chairmanship of the President of the Treasury Board “to ensure that privatization [was] accorded a high priority on the government’s agenda.”⁷² Finance Minister Michael Wilson characterized the government’s intended direction as “a fundamental break with the past [...] it challenges Canadians by rewarding success, not subsidizing effort.”⁷³

The Nielsen Report spelled the beginning of the end for the Science Council. The study team assigned to the Science Council did not recommend a reduction in funding, but the Report provided the rationale for a substantial budgetary reduction, leaving the SCC with barely enough resources to complete ongoing studies, let alone initiate major new ones. It is worth noting that the study team reported that its observations were necessarily “subjective” given the “limited time and expertise” available (“sixteen non-expert people” spent “an average of less than three person days per program”).⁷⁴ Notably, none of the team’s members had a background in science and technology. The group was critical of the Council’s role and work, and criticized the Canadian scientific community as well. First, the team noted that scientists in Canada had not, “despite encouragement and public seed funding” managed to sustain an organizational coherence along the lines of the American Association for the Advancement of Science. It suggested that many of the SCC’s objectives could be achieved by “a voluntary, self-financed association representing Canadian scientists.”⁷⁵ Moreover, Tom Siddon, Minister of State for Science and Technology, suggested his ministry “might take over the administration and communication functions of the Council.”⁷⁶

70. Study Team Report to the Task Force on Program Review, “Economic Growth,” *Services and Subsidies to Business: Giving With Both Hands* (Ottawa: Minister of Supply and Services, 1985), i.

71. Inwood, *Understanding*, 67-68.

72. Michael H. Wilson, *The Budget Speech: Securing Economic Renewal* (Ottawa: Department of Finance, 1985), 27.

73. *Ibid.*, 1.

74. “Economic Growth,” *Services and Subsidies to Business*, ii, 15-16.

75. *Ibid.*, 478-479.

76. Science Council of Canada, “Council Retains Independence, Budget Cut 50 per cent,” *In Touch* 2, 4 (1985): 1.

In the Council's view this was a more serious concern than the first suggestion. Subsuming the SCC within its overseeing department, MoSST, would effectively have removed the Council's 'arms length' status—a suggestion the Council felt threatened its independence. On budget night, the government announced it was cutting the Council's \$5 million budget in half.⁷⁷ It appeared that by the mid-1980s the government had grown tired of the apparently endless debate over science policy and science policy apparatus, and tired of the Science Council as well.

The Science Council was aghast at the outcome of the Nielsen Report. Incredulous at what appeared to be the impending diminution (and possible subordination) of their agency, a platoon of SCC members more than a dozen strong and led by the Chairman marched to the Prime Minister's office, as much to query as to protest. Unable to arrange a meeting, they then delivered their message and posed their questions to Tom Siddon. No answers were apparently forthcoming, so the Council delivered a letter to the Prime Minister the next day, protesting any suggestion the Council be placed under "the operational control of MoSST, a junior policy ministry that has never been effective."⁷⁸ As these maneuvers had produced no particular or satisfactory result, Council members, represented by the Chairman, Vice-Chairman and Council members Adam Zimmerman (Noranda, Inc. President) and David Suzuki, held a press conference on June 20. There, they described the cuts as "'punitive and draconian,' an attempt to 'muzzle' the Council and destroy its independent voice."⁷⁹ Five days later Siddon announced the cuts were final, but that the Science Council would remain independent.

The government's attempts to rationalize its programming indicated a shift in its mindset toward science, the economy, and the role of government: by 1985, it had already committed to a market-oriented, *laissez faire* posture with regard to funding S&T. Its gaze was now fixed on the hegemony of market pull—in tandem with trade liberalization—as stimulus. The Macdonald Commission addressed the second aspect of this latest posture: trade liberalization.

The 1985 Royal Commission on the Economic Union and Development Prospects for Canada, or Macdonald Commission, was another key study underpinning the Conservative government's policy reorientation. It came to symbolize the triumph of continental free trade over the politics of nationalism in Canada, and the triumph of a free trade policy for science and technology over the technocratic vision of the SCC. As the postwar faith in liberalism waned, the postwar Keynesian economic consensus

77. "Economic Growth," *Services and Subsidies to Business*, 478-479.

78. [s.a], "Our Eye on Science," *The Globe and Mail*, 25 June 1985, 6.

79. Science Council of Canada, "Council Retains Independence," 1.

which supported it disintegrated.⁸⁰ The Macdonald Commission was appointed by Trudeau in 1982 and the examination of Canada-US free trade was one part of its study of the economy.⁸¹ Gregory Inwood observes that the Commission “reflected the disharmony in Canadian political discourse”; it became a site of contention “between advocates of the crumbling nationalist mode of politics and the proponents of a more continentalist economic regime.”⁸² Despite the fact that the majority of submissions to the Commission at least loosely supported the former mode, and despite the 1984 pre-election assertions of Conservative Party leader Brian Mulroney that he opposed free trade between Canada and the US, the Mulroney government began negotiating a free trade agreement with that country in 1985.⁸³

Continentalism and the Autumn Years of the SCC

Though in retaining its independence after the Nielsen Report the Council had won the battle (it continued its research and continued to criticize the government), in the wake of the budget cuts it appeared to have lost the war: the period from 1985 until the Council’s dissolution in 1992 showed a ‘winding down’ of its wide-ranging activities, and of its demands upon Ottawa to formulate an industrial strategy. The SCC moved from delivering policy reports based on in-depth studies to issuing relatively lightweight official ‘statements’ based on workshop proceedings and discussion papers.⁸⁴ This change was not only a response to budgetary constraints but was part of an effort to further define and develop its constituencies; it reflected concern within Council regarding both the timeliness and accessibility of its substantial research reports, and

80. Norrie and Owrarn, *A History of the Canadian Economy*, 437. See also Margaret Conrad and Alvin Finkel, *Canada: A National History* (Toronto: Pearson Education Canada Inc., 2003), 532; Simon Marginson, *Markets in Education* (Sydney: Allen and Unwin, 1997).

81. Doern, *Faith and Fear*, 24-25.

82. Inwood, *Continentalizing*, 7.

83. *Ibid.*, 15.

84. For more detail on Science Council workshops and discussion papers, see, for example: Science Council of Canada, *A Workshop on Information Technologies and Personal Privacy in Canada* (Ottawa: Minister of Supply and Services, 1985); Science Council of Canada, *The National Science and Technology Policy Forum, Winnipeg, Manitoba (report of proceedings)* (Ottawa: Minister of Supply and Services, 1986); Science Council of Canada, *University Spin-Off Firms: Helping the Ivory Tower Go to Market-Proceedings* (Ottawa: Minister of Supply and Services, 1987); Science Council of Canada, *Enabling Technologies; Springboard for a Competitive Future: A Statement* (Ottawa: Minister of Supply and Services, 1989); Science Council of Canada, *Firing Up the Technology Engine: Strategies for Community Economic Development: A Joint Statement* (Ottawa: Minister of Supply and Services, 1990).

discussion around how best to communicate its views to its audience. As part of this initiative the Council released the premier issue of its newsletter, *In Touch*, in late 1983, which included mail-back cards in order to facilitate feedback from readers.⁸⁵ Yet this period also marked the early stages of a contraction in its involvement in debates over economic policy *per se*. In that regard the Council attempted to develop a ‘third way’ between a rationally managed economy on the one hand, and an undirected, market-driven economy on the other. To this end, it further shifted its attention to private sector initiative, and to the need for more and better linkages between business, industry, and Canada’s universities.

On this last point the Council aligned with emerging continental and international trends. In the US, the 1980 Bayh-Dole Act and similar legislation aimed at encouraging private-sector innovation by strengthening intellectual property rights acquired through R&D. This legislation, and the philosophy behind it, appeared to portend major shifts in the way science and technology research was funded, as well as the relationship between research, industry and universities. Historically, Washington’s funding stimulus to universities through direct grants presumed government ownership rights of inventions or other intellectual property resulting from that funding.⁸⁶ The Bayh-Dole Act reversed this presumption of title, and allowed universities and small businesses to assume ownership of intellectual property, all in the interests of encouraging university-industry alliances to exploit new innovations, and of encouraging *industry* funding of research in universities.⁸⁷ In the 1980s, other OECD countries responded to anticipated trends by pursuing—formally or informally—‘Bayh-Dole like’ policies focused on the “deliverable” outputs of scientific research.⁸⁸ In Canada these developments served at the least to reinforce the perception of an urgent need to adapt within the new economic realities.

It was clear by the late 1980s, in the North American context at least, that the notion of an activist government was out of vogue, and the market was expected to divine how best to optimize the results of scientific research. The Nielsen Report had made the Canadian government’s intention to

85. Science Council of Canada, “Premier Issue: Keeping You In Touch,” *In Touch* 1, 1 (1983): 1.

86. For a general discussion on this topic see Daniel S. Greenberg, *The Politics of Pure Science* (New York: New American Library, 1970); Michael D. Reagan, *Science and the Federal Patron* (New York: Oxford University Press, 1969).

87. For a discussion emphasizing an alternative explanation of shifts in American funding of science see Philip Mirowski and Esther Sent, “The Commercialization of Science and the Response of STS,” in *The Handbook of Science and Technology Studies*, ed. Howard J. Hackett et al., 3rd ed. (Cambridge: MIT Press, 2008).

88. Jan Fagerberg et al, eds., *The Oxford Handbook of Innovation* (Oxford: Oxford University Press, 2006), 232.

withdraw from the ‘micromanagement’ of economic life explicit.⁸⁹ Internationally, the general trend led away from overt interventionist policies.⁹⁰ The Science Council’s shift of focus to private sector initiative and industry-university collaboration was a clear response to the new economic climate. The Council saw industry-university collaboration—under the guiding hand of government—as perhaps its best chance for yoking S&T to the pursuit of national social and economic goals. The bulk of the Council’s work in its final years, then, was focused on this theme.

The SCC continued to exhort the government regarding the need for a national industrial strategy, but now looked to provincial and municipal governments in collaboration with private industry to develop industrial strategies linked in a national chain. It cited instruments of provincial government industrial strategies such as the Provincial Research Organizations (PROs)—as demonstrative examples. PROs were established separately in eight provinces over a period of almost fifty years as “quasigovernmental, not-for-profit agencies designed to provide technological assistance to industry and to undertake R&D of a particular interest to their province.”⁹¹ The SCC urged “the [government’s] fullest support” for collaboration between PROs, universities and industry.⁹² Yet the Council had reservations: it feared that the *regional* strategy trend “could diminish any hope of promoting collective, *national* action on industrial policy,” and it thought progress was most likely to come from bilateral efforts, from harnessing “the energies of the two levels of government.”⁹³

Globally, the end of the 1980s witnessed massive political and economic upheavals—foremost among them the collapse of Soviet communism and the rise of Asia’s ‘Four Tigers’ as a financial force—that wrought profound effects on the movement of Western capital. In Canada, this was accompanied by the ascendancy of neoliberal philosophy: a major restructuring of Canadian society and the economy, and a rewriting of the postwar political and economic consensus. In the face of an apparently inexorable wave of continentalism, and under the long shadow cast by the Macdonald Commission (its signature recommendation that Canada negotiate a free-trade agreement with the US came to fruition in 1987),

89. Wilson, *The Budget Speech*, 11.

90. Aant Elzinga, “Research, Bureaucracy, and the Drift of Epistemic Criteria,” in *The University Research System: The Public Policies of the Home of Scientists*, ed. B. Whittrock and Aa. Elzinga (Stockholm: Almqvist and Wiksell, 1985), 191-217.

91. Donald J. LeRoy and Paul Dufour, *Partners in Industrial Strategy: The Special Role of the Provincial Research Organizations-Summary*, Science Council of Canada Background, Study No. 51 (Ottawa: Minister of Supply and Services, 1980), 4.

92. LeRoy and Dufour, *Partners in Industrial Strategy*, 12-13.

93. *Ibid.*, 5-9.

the SCC mounted its last serious attempt to influence the direction of the federal government at the international policy level. It issued an official Council ‘Statement’ entitled *Placing Technology Up Front: Advising the Bilateral Trade Negotiators* (1986) which contended, among other things, that “technology had taken a back seat” in negotiations to a focus on ensuring access to US markets for “fish, hogs, and logs.”⁹⁴ This was a clear reference to Canada’s unhealthy economic dependence on resource commodity exports, and by implication, the ‘hewers of wood, drawers of water’ economic role for Canadian industry and society.

By 1990, the Science Council seemed to have lost the struggle over Canadian science and technology policy: reeling from severe budget cuts, stung by an apparent lack of appreciation of its work from the federal government and the public, its role had become diffuse and diluted. Moreover, the international and domestic developments noted above had conspired to render its by-now-modified vision obsolete. The Council’s demise was decidedly anticlimactic: it was only one small craft among many capsized by the wave of government fiscal reform sweeping through departments and agencies in the wake of the 1992 federal budget. It produced few serious ripples as it sank out of sight, especially when contrasted with the uproar accompanying the 1985 budget cuts: no marches were mounted to the Prime Minister’s office, and no press conferences were called. However, the perception that the Science Council and other such agencies (forty-six in total) had been cut because they were too critical of government—was widespread.

Popular reaction to the Council’s demise revolved mainly around two overlapping notions: that the government was foolhardy to eliminate valuable, ‘arms-length’ agencies, and the suspicion that the SCC was cut because it was so doggedly critical of the federal government. One writer (to the Toronto *Globe and Mail*) opined that cutting such agencies would “reduce our ability to scrutinize public policy freely, explore options unencumbered by government directives, and engage in free and open debate of such policy options.”⁹⁵ Another quipped of the federal budget, “this may be the first one year budget with a five-year marketing horizon.”⁹⁶ Others, though lamenting the Council’s demise, observed that the Council was ‘out of step’ and noted its lack of effective access to and

94. Science Council of Canada, *Placing Technology Up Front: Advising the Bilateral Trade Negotiators* (Ottawa: Minister of Supply and Services, 1986), 7.

95. Claude Lajeunesse, “BUDGET CUTS, Dimming the Beacons to the Future. The Closing of Canada’s Research and Advisory Councils Will Leave the Country Groping in the Dark in a Changing World,” *The Globe and Mail*, 19 March 1992, sec. A.

96. Terrence Corcoran, “Mild Applause for the Great Windup,” *The Globe and Mail*, 26 February 1992, sec. B.

influence in the “corridors of power.” They asserted it had “died a natural death.”⁹⁷ Liberal MP Charlene Catterall had what was perhaps the last word: “the government,” she observed, “is very good at getting rid of its critics.”⁹⁸

The Commercial Turn in Canadian Science Policy

Between 1985 and 1992, even before the final demise of the SCC, the government had created a whole new apparatus for science policy advice that was much more in tune with the neoliberal times: the National Advisory Board on Science and Technology (NABST). Formed in 1987, NABST was largely comprised of private-sector members, and was to advise the Prime Minister directly and *privately* on S&T issues.⁹⁹ Somewhat ironically, the Council had viewed the role of NABST as complementary to its own: NABST was to deal with current issues and tender advice privately, while the SCC was concerned with longer-term issues and operated in public.¹⁰⁰ Generally, NABST reflected the market orientation and focus on innovation and entrepreneurship that had come to characterize government policy in the late 1980s.¹⁰¹

Another change flowing from the establishment of NABST was the harmonization of federal-provincial relations (a focus of the SCC after 1985) around a national science and technology policy through an agreement signed between federal, provincial, and territorial ministers in March, 1987. *A National Science and Technology Policy* revealed that a shared interest in increased commercialization of science and technology initiatives provided a firm basis for federal-provincial consensus. *InnovAction: The Canadian Strategy for Science and Technology* (1987) constituted the federal government’s policy response to the outcomes of the March, 1987 forum.¹⁰² This initiative was advanced by \$1.5 billion in federal funding and a new ‘superministry’ (which also subsumed MoSST) was established to lead it: Industry, Science and Technology Canada (ISTC).¹⁰³ A significant outcome of these developments was the establishment of a

97. De la Mothe, “A Dollar Short and a Day Late,” 879, 885.

98. Ross Howard, “PM Denies Critics Being Silenced. Cutting of Independent Advisory Councils ‘Government Streamlining’,” *The Globe and Mail*, 27 February 1992, sec. A.

99. G. Bruce Doern and Jeffrey Kinder, “One Size Does Not Fit All: Government Laboratories as Diverse and Complex Institutions,” *Journal of Canadian Studies* 37, 3 (2002): 33-55.

100. Science Council of Canada, *Annual Report, 1986-87* (Ottawa: Minister of Supply and Services, 1987), 1.

101. Doern and Kinder, “One Size Does Not Fit All,” 43.

102. Brian Wilks, *Browsing Science Research*, 22; Atkinson-Grosjean, 47.

103. Atkinson-Grosjean, 47.

program operated under industry-academe partnerships: the Networks of Centers of Excellence Program. As for the Science Council, the axe fell with the 1992 federal budget—a budget focused, as in 1985, on streamlining measures that might have been expected to realize substantial savings. The actual amount was \$22 million, while the costs for the Privy Council office had meanwhile doubled from the previous year to over \$102 million per year.¹⁰⁴

The replacement of Mulroney's Conservative government by a Liberal one in 1993 appeared to accelerate the shift to the commercial turn: a preoccupation with deficit reduction curtailed funding to Canada's Research Councils, and in 1993, Industry, Science, and Technology Canada was reconstituted as simply Industry Canada. The message was plain; science was now subordinate to industry.

Specific manifestations of this late twentieth-century commercial or 'strategic' turn in Canada's science policy—and its implications for the conduct and outcomes of scientific research—have been identified by a number of commentators. Elizabeth Moore, investigating 1980-1990 policy innovations in federal agricultural research, found the advent of "market-based policy ideas and a more businesslike approach"¹⁰⁵ meant the strategy of developing innovations available to all farmers changed to one centered on "meeting the needs of the agricultural industry."¹⁰⁶ Benoît Godin, *et al*, used bibliometric techniques to probe the implications of the shift to a strategy of 'oriented research'—and concomitant increase in university-industry collaboration—between 1987 and 2005. Their analysis revealed that over this period industry and the federal government doubled their collaborations with universities; provincial government-university collaborations more than doubled. Such collaborations seemed "to be of particular benefit to industrial research": they saved firms the cost of having to support their own research infrastructure.¹⁰⁷ Atkinson-Grosjean's detailed analysis of the Canadian Genetic Disease Network points to the NCE program's emphasis on "circumvent[ing] university autonomy and control over research" and its drive "to change the research culture." It also seeks to change the way that researchers see themselves: not only as employees of the university and contributors to their discipline but as part of a national system of

104. Stevie Cameron, "INFLUENCE Budget Spins Tale of Revenge, Silliness," *The Globe and Mail*, 2 March 1992, sec. A.

105. Elizabeth Moore, "The New Direction of Federal Agricultural Research in Canada: From Public Good to Private Gain?" *Journal of Canadian Studies* 37, 3 (2002): 112-126.

106. Stephen Bocking, "Introduction. Agendas, Interests and Authority: Science and Politics in Canada," *Journal of Canadian Studies* 37, 3 (2002): 5-13.

107. Benoît Godin, Christian Doré, Vincent Larivière, "The Production of Knowledge in Canada: Consolidation and Diversification," *Journal of Canadian Studies* 37, 3 (2002): 56-70.

innovation in which “commercial opportunities are as prized as new knowledge.”¹⁰⁸ She argues that “market forces and neoliberal public-sector reforms have fundamentally reshaped research funding and science policies.”¹⁰⁹ David Holdsworth examines Industry Canada’s 1996 *Science and Technology for the New Century* and describes it as “a doctrinaire cobbling together of market-oriented slogans, valorizing industrial innovation above all else.”¹¹⁰ He explains that the notion of “innovation” had been inserted into science policy discourses by SCC *Report No. 4 Towards a National Science Policy for Canada*, and he argues that by 1996 “innovation” had become “the entire *raison d’être* of science policy.”¹¹¹

Conclusion: The Canadian Retreat from a Transformative Politics

The science policy instruments that have proliferated in Canada since the SCC’s demise—a detailed account is outside the purview of this paper—share a common element: they are underpinned by an emphasis on commercialization and innovation. By the 1980s the ideological underpinnings of Canadian science had shifted significantly.¹¹² The collapse of the linear model was followed by a revival of the ideas of economist Joseph Schumpeter that refocused policy-emphasis on aggressive entrepreneurship, market-competition, and discontinuous innovation—all inspired in part by the examples of Silicon Valley. But if Neoschumpeterianism won the loyalty of some innovation theorists and policy-makers, even more opted for a second front in innovation theory. This more cognitive theory of innovation and how to encourage it stressed knowledge-stocks and intellectual property, and how they could be nurtured by ‘clustering’ and ‘networking’ related firms and institutions. In Canada, the latter found expression in renewed R&D spending by Ottawa through new programs such as the Canada Foundation for Innovation, Genome Canada, and the NCE. Government therefore did not retreat completely from policy initiatives aimed at ‘steering’ society through science, but rather looked to base those initiatives on market principles and commercial ‘relevance’ that would encourage networking, public-private partnerships, and a focus on intellectual property and commercialization.

108. Janet Atkinson-Grosjean, “Canadian Science at the Public/Private Divide: The NCE Experiment,” *Journal of Canadian Studies* 37, 3 (2002): 71-91; Bocking, 7. See also Atkinson-Grosjean’s book-length discussion in *Public Science, Private Interests*.

109. Atkinson-Grosjean, “Canadian Science,” 72.

110. Holdsworth, “Science, Politics, and Science Policy in Canada,” 24.

111. *Ibidem*.

112. For a discussion of such broad cultural and ideological shifts in the (primarily) American context see Paul Forman, “The Primacy of Science in Modernity, of Technology in Postmodernity, and of Ideology in the History of Technology,” *History and Technology* 23, 1 (2007): 1-152.

The demise of the Science Council in 1992 followed closely behind these shifts whereby the complexities of how best to drive commercializable innovation—what apportion of funding to devote to basic or applied research, or development, and so on—were supplanted by the complexities of the market and market-driven innovation policy. Economists had generally been troubled by the linear model, by its reliance on the unpredictable nature of basic and applied science as the source of ultimately commercializable new ideas. By the 1980s politicians and policy-makers rebelled against it as well. Atkinson-Grosjean, among others, describes the “strategic science regime” that emerged during the neoliberal high tide of the late 1980s as driven by the market-like principles of cost-recovery, competitiveness, and “entrepreneurship in the delivery of public services.”¹¹³

The issue of realizing national goals through the ‘steering’ of science was a source of tension for the SCC. In the absence of an integrated policy from the government, its promotion of the use of S&T in the pursuit of national social and economic goals required to some extent that the Council *define* those goals. The SCC was not entirely comfortable with this role, but felt it was a necessary one nonetheless: as Omond Solandt put it to the Lamontagne Committee in 1970, “somebody has to start.”¹¹⁴ For over twenty-five years it functioned as a provider of information and advice for the government’s (and public’s) navigation of the late twentieth-century scientific and technological highway. In the diminished state it found itself in after 1985, however, the SCC had resources only to set up an information kiosk, so to speak, devoted, essentially, to telling Canadians about where they *could* have been going.¹¹⁵ The Science Council, though it mounted a late attempt to align itself with the trend toward commercialization, was in this sense effectively bypassed by the commercial turn in the road. In this way, its dissolution represents an important example of the passing of an idea: that a nation and its economy—and the science and technology they depend on—could be rationally managed for the *public* good. By the 1990s, it was clear that policies based on faith in the transformative power of S&T for the national (and nationalistic) good were out of fashion.

113. Atkinson-Grosjean, “Canadian Science,” 78-79; see also Arie Rip, “Regional Innovation Systems and the Advent of Strategic Science,” *Journal of Technology Transfer*, Special Issue on Regional Innovation Systems 27, 1 (2002): 121-131.

114. De la Mothe, “Circumstantial,” 6.

115. G. Brent Clowater, “Information Kiosk on a Highway to Nowhere: The Science Council of Canada and the Retreat from Transformative Politics, 1978-1992” (MA thesis: University of New Brunswick, 2007).

Historian Charles Maier writes of the retreat from transformative politics as “the late twentieth century diminution of what we believe politically possible, [as] our age of failing expectations.” Maier asserts that at the close of the twentieth century, “Western societies have come to the end of a massive collective project [...] the end, or at least the interruption, of the capacity to found collective institutions that rest on aspirations for the future.” Our political representatives, he maintains, “do not believe in public goods that inevitably can be enjoyed by all.” And he suggests that even the modern nation state is among the public goods that “no longer compel our loyalties.”¹¹⁶ In the postmodern, post-industrial context, the retreat he speaks of testifies to the loss of a ‘future’ orientation or consensus about its essence, to a diminished sense of progress toward civic enfranchisement and growing equality, and to the senescence of the nation state as the principal author of that future. Maier was not talking about science and technology, or S&T policy, much less Canadian science policy, yet this is a useful lens through which to view the changes in Canadian society and political culture, and the shift in Canada’s approach to science policy that occurred between roughly 1980 and 1990. It is also a useful lens through which to view the story of the SCC. In this view the 1992 dissolution of the Science Council appears as more than just the beginning of the end of Canada’s attempts to formulate a national policy for science, more than an element of a disintegrating consensus about the role of science and technology in Canada’s economic development strategies: it was part of the Canadian version of a general retreat from transformative politics.

The tone of the Council’s approach was set early on—in the heady days of postwar prosperity—and was infused with a sense of responsibility for the ‘project’ of Canada. It viewed scientists and government as autonomous partners in nation building. Although that mood began to change as early as the 1960s, and by the 1980s even the SCC had begun to respond to the new winds of policy, it believed to the end that it was government rather than the market that would—and should—provide direction for Canada’s science policy. The SCC appeared not to realize that it was not government management (or ‘mismanagement’) that threatened the pursuit of national goals through science, but rather the determination to subordinate scientific research to the thrust of commercialization.

116. Charles Maier, “A Surfeit of Memory? Reflections on History, Melancholy and Denial,” *History and Memory* 5, 2 (1993): 136-152.