

Community Participation and Multilevel Governance in Economic Development Policy

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Introduction¹

This paper surveys our current state of knowledge about alternative mechanisms for governance at the local and community level to formulate business attraction and economic development strategies, within the context of multilevel governance. It examines the historical experience with policy approaches at the federal and provincial level, as well as current research. It draws upon relevant illustrations from the case study literature in the US and Europe to identify the emerging frontier of best policy practice and describes some specific policy initiatives in these jurisdictions and the experience with them. It then surveys the historical development of the mix of policies in Ontario to support economic development and business attraction and concludes with a section that highlights how this policy mix can be adapted to reflect the best practice that is emerging both domestically and in other jurisdictions. The paper advances the argument that what has been characterized as institutional weaknesses and failures of governance in the past may prove to be sources of strength in the emerging paradigm of the knowledge-based economy. A key role for the Ontario government lies in strengthening the governance capacity at the local and community level in order to deploy its enabling powers more effectively to promote a process of social learning among firms and local institutions.

The appropriate role for the public sector in economic development policy has been controversial in Canada. Driven partly by ideology and partly by ongoing changes in the economic environment, this debate has played out over the past half century through drastically different policy approaches. In the Keynesianism era of the early postwar period, the state adopted a new role in the economy, adjusting macroeconomic conditions to promote demand, opening the Canadian market to freer trade through successive rounds of multilateral trade negotiations, and encouraging massive inflows of foreign investment in the resource and manufacturing sectors to accelerate the pace of economic development. By the late 1970s, the efficacy of the Keynesian paradigm had been undermined by its inability to cope with the combined problems of rising inflation, unemployment, and a growing surplus capacity in the global economy. In its place came a revival of neo-liberal thought which continues to be a dominant force in shaping economic policy. The shift to a neo-liberal paradigm was marked by greater emphasis on the use of monetary policy instruments, a continuing series of labour market reforms and a greater emphasis on a 'trade-led' economic development strategy, symbolized by the Macdonald Royal Commission's support for the negotiation of a free trade agreement with the United States (Wolfe 1978; Wolfe 1984b).

Throughout this period the design of policy at both the federal and provincial level was marked by disagreements over both the need for a more interventionist economic development policy and the suitability of the state structure and institutions of governance to support such an approach. These debates reached their high point in the late 1970s and early 1980s as the combined effects of the Tokyo round of multilateral tariff reductions, declining productivity and competitiveness in key sectors of the domestic economy and the emergence of surplus capacity at the global level subjected many traditional industries to greater pressure. While governments at both the federal and provincial level experimented with a series of policy initiatives during this period – the Sector Task Forces, the Board of Industrial Leadership, and the Megaprojects Strategy – the definitive evaluation of the Macdonald Royal Commission was that these policy

¹ The authors are indebted to Neil Bradford for his insightful comments on the first draft of this paper. Parts of the paper draw upon research conducted jointly by David Wolfe with Meric S. Gertler.

instruments were difficult to wield effectively and that the combination of the openness of the Canadian economy, the lack of societal structures for consensus formation, and the federal structure of the polity made Canada's institutional basis singularly unsuitable for the implementation of more interventionist economic policies.

In the past fifteen years of rapid technological change, and concerns over global competition and production, the debate over economic development has shifted once again. From studies of East Asia's industrial success, the debate over the emergence of the New Economy in the US and the greater attention focused on the innovative capacity of various regional economies, new theoretical insights have emerged, greatly influencing the language of policy debates. The greater emphasis on the role of innovation, for example, reflects the cumulative impact of the past decade of work by both domestic and international bodies that have contributed to a better understanding of its critical role as a driver of economic growth. Indeed, it is widely acknowledged within the OECD that the Sundquist Report, produced in 1988, marked a turning point in the organization's understanding of the broader relationships between technology, the economy and society. The Sundquist Report stressed the interdependent nature of technological, economic and social change and emphasized the longer-term implications of technological innovation for the broader processes of economic development and set off a decade of more complex studies that have examined the process in greater detail (OECD 1988; 1991; 1992; 1996b; 1997; 2000).

Region and locality have also become an important part of the lexicon, bringing recognition to how key elements of innovative sectors, namely knowledge creation and learning, are locally influenced and rooted. More recent still, is the emphasis on governance, as opposed to government, which reflects a shift in understanding that rejects the hierarchical approach to industrial restructuring of the past, in favor of a more flexible multilateral process of negotiated economic development. In Europe, the shift has been matched by a growing interest in, and involvement with, economic development policy at the regional, as opposed to the national or supra-national level, partly as a result of the contribution made by the Structural Funds of the European Union to promoting innovation at the regional level. The European interest in regional innovation strategies is matched by a growing fascination with the role of clusters as incubators for dynamic and innovative industries at the regional and local level in North America. This fascination, in turn, has sparked a growing interest at both the state and local level in how local communities organize themselves to attract dynamic and innovative firms to invest in their communities, as well as how to seed the growth of clusters.

As a consequence, approaches to economic development policy have changed dramatically in the past decade in both Europe and the US, as the locus of attention has shifted from the national to the regional and local levels. In the Canadian context, our overwhelming preoccupation with things federal has led to a tendency to overlook the considerable degree of experimentation that has occurred at both the provincial and the local level over the past decade or to view the growing interest in multilevel governance through the conventional lens of 'federal-provincial' relations. Thus the debate in this country has failed to note a subtle, but important shift in the terms with which it is engaged in other countries, especially Europe, but also in the US. The gradual diffusion of these insights has contributed to a new policy paradigm for economic development that, far from calling for more or less state intervention, supports a change in the mode of intervention. Rather than a national top down approach to the design and administration of economic development policy, this new paradigm is regionally and locally focused and depends on the cooperation and collaboration of all levels of government, as well as

non-state organizations, for the effective pursuit of its economic objectives. Moreover, the paradigm caters more broadly to knowledge creation, innovation and learning, rather than to the needs and demands of particular industries or firms, emphasizing support for the institutions that promote knowledge creation as well as the linkages between the many actors involved in innovation. How firms are coordinated externally has become as important as, if not more than, their internal capabilities in explaining economic performance.

The aim of this paper is to elaborate upon this new policy paradigm, summarizing the various theoretical insights upon which it is based. It surveys past policy approaches and debates to indicate some of the reasons for their failure. This is followed by a discussion of how policy design and delivery is affected in the emerging knowledge-based economy, giving emphasis to multilevel participation and administration. Finally, the paper looks at what this paradigm means for business attraction strategies. In attracting industry in a knowledge-intensive economy, it is not just the 'hard' institutions, such as universities and R&D centres, that matter, but also the softer, more intangible ones upon which cooperation, collaboration and ultimately, learning depend.

Part I: The Ontario Context

The Changing structure of the provincial economy

Before exploring this emerging perspective on economic development policy, however, we review the changing structure of the provincial economy and the challenges it has faced in the transition to a more continentally and globally integrated production and trading regime. The current perspective on economic development policy has its roots in the 1970s when the long period of growth and prosperity that prevailed since the end of World War II began to fade. Under the combined pressure of trade liberalization produced by the successive rounds of GATT negotiations running from 1947 through the Tokyo Round of the 1970s, the industrial structure of the domestic economy was exposed to more intensive international competition. This occurred in tandem with the slowdown in the rate of economic growth, declining productivity levels and rising unemployment resulting from the exhaustion of the growth potential in the postwar paradigm of standardized mass production (Glyn, Hughes, Lipietz, et al. 1990, 72–98).

At the core of the problem was the growing inability of manufacturing firms to compete effectively at the international level, combined with the relative weakness of those industrial sectors associated with higher value added or high technology products. Throughout the 1970s, Canada's surplus on the merchandise trade balance expanded considerably, but the expansion masked the underlying reality of a rapidly diverging trend in the two major components of the export trade. The positive trade balance in raw materials and semi-manufactured products increased by leaps and bounds, partly as a result of the greater demand for primary commodities in the world economy, and partly as a result of the significant devaluation of the Canadian dollar after 1976. Conversely, the deficit on trade in manufactured end products (including trade under the Auto Pact) persisted well into the 1980s. The same pattern was evident with respect to Canada's trade on the basis of the research intensity of the manufacturing industries. The trade surplus in industries with medium research intensity rose steadily over the period, but these consisted primarily of industries producing resource-based products. Of the total surplus generated by this group of industries, the largest proportion was accounted for by exports of paper and allied products, primary metals and petroleum and coal products. During the same period, the trade deficit in industries with high research intensity grew significantly (Wolfe 1984a).

Ontario, as the industrial heartland of the national economy, exhibited many of the same trends observed for the country as a whole. Traditionally, Ontario benefited disproportionately from federal policies of import substitution industrialization associated with the National Policy tariffs, patent legislation and the exploitation of Canada's preferred status within the British Empire. The result was a strong manufacturing sector, based excessively on the presence of foreign branch plants with production geared to the domestic economy. In the expansionary atmosphere of the 'golden age' after World War II, provincial governments in Ontario were content to rely upon federal macroeconomic management of the economy and Canada's improved trade relations to create the appropriate context for provincial economic development. To the extent they pursued a consistent set of economic development policies, provincial governments focused on the supply side, rather than the demand side. They viewed their primary role as the provision of infrastructure investment in highways, electric power generating capacity, support for municipalities in building water and sewage systems, and, in the decade of the 1960s, a dramatic expansion of the post-secondary educational system. In policy areas of critical import for the

provincial economy, such as the imbalance in automotive trade between Canada and the US, the provincial role was constrained by its relative exclusion from jurisdiction over trade issues. The Automotive Products agreement negotiated by the federal government with the US in 1965 was the most significant piece of industrial policy for the province in this period. Overall, the Conservative governments which ruled from 1943 to 1985 were preoccupied with maintaining a 'favourable investment climate' for private business in the province by controlling spending and managing the provincial debt (Rea 1985, 22–23, 204–05; Williams 1971).

This complacency began to fade in the late 1970s as the industrial heartland experienced the economic slowdown and restructuring that affected other industrial economies in the wake of the oil price shock and mid-1970s recession. Ontario was particularly hard hit by the impact of the dual energy crises in 1973-74 and 1979-80. The energy price shocks contributed to the economic slowdown and increased global competitiveness that impacted most of the industrial economies. Ontario was spared the worst effects of the energy price shocks by the federal government's two-price energy policy – especially in comparison to the US where the economy as a whole, and manufacturing in particular, absorbed the full impact of the price hikes more immediately. Courchene and Telmer argue that the protection afforded the provincial economy may have been a mixed blessing. "Because the Americans more or less took the full brunt of the energy shock, the US manufacturing sector began restructuring for the new world order much earlier than did the Ontario manufacturing sector" (Courchene and Telmer 1998, 51). However, the delayed consequences of this strategy were not apparent for more than a decade. Ontario remained sheltered from the full impact of the second oil price shock of 1979-80 as well. For the most part, Ontario was spared the major job losses, downsizing and restructuring that occurred in the US Midwest during the recession of the early 1980s. Ontario's recovery from the trough of the 1982 recession was so strong that the provincial growth rate outperformed the rest of the country and the US as well for the remainder of the decade. Buoyed by a highly competitive exchange rate and social benefits that contributed to lower wage costs in critical sectors, such as autos and auto parts, and a wave of new divestment by both American and Japanese multinational corporations, Ontario rebounded from the recession with growth rates exceeding 4 per cent (in real terms) through the rest of the decade – 5.3% in 1985, 6.1% in 1986, 4.5% in 1987 and 6.7% in 1988. The unemployment rate fell to 5.1% in 1988 and 1989, a level not achieved since the early 1970s (Table 1), and was actually lower than that of the US (Courchene, et al. 1998, 21,71).

All this changed dramatically in 1990. Although Ontario had become gradually more integrated into the North American economy over the postwar period, the introduction of the Free Trade Agreement with the US in 1989 accelerated the restructuring of the manufacturing sector. US multinationals rationalized most of their production in the low wage, low value-added segments geared to serving the domestic market. Many of these plants were not as technologically sophisticated as their US counterparts or could not realize equivalent economies of scale (O'Grady 1994, 257). Similarly, many indigenous Canadian firms turned their attention towards expansion into the larger and more lucrative US market. This economic restructuring combined with an excessively tight monetary policy², an overvalued currency and the introduction of a new

² The prime rate in Canada increased from 9.5 percent in 1987 to 14.1 percent in 1990, pushed up by changes in the Bank of Canada rate (from 8.4 percent to 13.0 percent) – partly out of a growing concern on the part of the Bank with the excessive increases in government spending in Ontario throughout the boom. During the same period, the value of the Canadian dollar rose from 72 cents (US) to 84.5 cents (US) in 1989, and to 87.3 cents (US) in 1991.

federal Goods and Services Tax (a form of value added tax) to produce the most severe economic downturn experienced since the 1930s. From the peak to the trough of the recession, Ontario's real output declined by 7.8%, and 320,000 people lost their jobs – almost two thirds of whom were in the manufacturing sector. The unemployment rate rose precipitously during the early part of the decade and peaked at 10.9% in 1993, its highest level since the Great Depression. The severity of the recession was most apparent in the dramatic decline of fixed business capital investment – virtually all of it caused by a 21.5 per cent fall in residential and nonresidential construction from 1989 to 1994 (Wolfe and Gertler 1998).

Even after the end of the recession, real output rose at a considerably slower pace than in the previous recovery of the mid-1980s and the average level of employment in 1995 had still not reached the pre-recession peak of 1989. In the later half of the decade, however, the pace of economic expansion accelerated under the stimulus of a declining exchange rate, increased demand for Ontario's products in the US market, a rapid decline in both nominal and real interest rates to levels not seen since the early 1960s and a series of reductions in personal and corporate taxes introduced by both the provincial and federal governments. However, unemployment remained doggedly high throughout this period and the divergence in the Ontario's rate of employment and that of the US was quite marked. Total employment rose to 5,962,700 by 2001, but the unemployment rate fell to only 5.7 per cent in 2000, the peak of the late 1990s boom, before rising back to 7% by late 2002 (Table 1). While the overall level of economic performance deteriorated slightly in the post-2000 period, overall levels of economic output in Ontario have remained strong relative to its major trading partner south of the border.

Behind the cyclical trends discussed above is a longer-term shift in the industrial structure of the provincial economy. Over the past decade and a half there has been a persistent decline in both the absolute and relative levels of manufacturing employment. From 1981 to 2001, while the civilian labour force increased from 4,590,000 to 6,364,000, the share of employment in the goods producing industries (primary industries and manufacturing) declined from 35 per cent of the total labour force to 20 per cent (Table 2). Employment in the primary and secondary industries declined moderately from 1,493,000 to 1,204,000, while the vast majority of employment growth was accounted for by the service sector, which increased from 2,888,000 in 1981 to 4,361,000 in 2001 (Table 2). This shift in industrial structure – especially the relative decline of manufacturing – is considerably more muted when measured in terms of output (Gross Domestic Product at factor cost), rather than employment. Manufacturing output has remained steady at close to 25 per cent of total output over the past decade (Wolfe and Gertler 2001).

Key Industrial Sectors

Within the manufacturing sector as a whole, the ranking of the top ten industry sectors has remained relatively constant for the past four decades. Transportation equipment and food and beverage have consistently ranked first and second in terms of the value of shipments and other revenue. The most striking feature, however, is the dramatic increase in the overall size and economic significance of the transportation equipment sector (of which automotive assembly and parts make up roughly 90 per cent). The total value of factory shipments in the sector (which includes both imports and valued added) increased from \$3.657 million in 1965 to \$121.701 billion in 1999 (in current dollars), while its share of manufacturing output more than doubled from 18.6 to 39.5 per cent (Table 3). The industry consists of two pillars. The Big Three automobile manufacturers plus Toyota, Honda, and Suzuki (in a joint venture with General

Motors) operate a total of thirteen assembly plants in Southern Ontario, from Windsor in the west to Oshawa in the east. Together, these plants reached their peak level of production at 2.98 million vehicles in 1999, over one million more than they produced in 1990. However, after reach this peak level of activity in 2000, overall vehicle production fell to 2.58 million vehicles in 2002 and was expected to fall to 2.504 million vehicles in 2003. Long-term industry analysts expect vehicle production in Canada to hold steady between 2.5 and 2.8 million vehicles; but this figure masks a steady decline in auto production by the Big Three US firms, each of whom has recently closed a major plant in Ontario, offset by increased output from the Japanese transplants in the province (Keenan 2003, B3). This assembly activity is supported by a large number of auto parts manufacturers, who supply assemblers throughout North America. As noted earlier, the 1965 Canada-US Auto Pact brought about a continental reorganization and rationalization of the industry, leading to a situation where Ontario-based parts producers could sell freely to assemblers in both Canada and the US.

The dominant position of the automotive industry within the manufacturing sector is even more significant if ranked in terms of exports, with motor vehicles and parts accounting for 41 per cent of total exports in 1999 and enjoying a positive trade balance of \$32 billion. Ontario currently ranks as the second largest auto producer in North America after the state of Michigan and exports more vehicles to the US than does Japan or Mexico. In 2001, fully 93 per cent of its international exports were destined for the United States, with Western Europe a distant second at only 3.2 per cent. This performance is due in part to the labour cost advantage of production in Ontario, estimated to be in the order of US\$10 per hour, that includes savings resulting from publicly provided medical care for employees – although this has undoubtedly been eroded by the rapid rise in the value of the Canadian dollar. It is also due to the reputation that the industry has acquired for both a highly skilled, reliable and productive labour force. Within the auto assembly sector, real productivity grew by an impressive 80 per cent between 1991 and 1999, and now exceeds US levels. Moreover, the average time required to assemble a vehicle has been estimated to be 10 per cent less in Canada than in the USA (Stanford 1999). Despite these impressive gains, the Ontario industry faces new challenges. Firms must continue to enhance their product development capabilities to satisfy assemblers' ever more stringent demands for improvements to product design, development and engineering. At the same time, parts producers are subject to ever-increasing downward pressure on prices, as assemblers move to source a higher proportion of their inputs on global markets. Not surprisingly, in the face of such pressing competitive challenges, all of the major players in the industry, including assemblers, parts producers (through the APMA) and the Canadian Auto Workers union, have called for significant new policy initiatives from both the provincial and federal governments. Despite the current political debate over the recent plant shutdowns by the Big Three and the loss of a high profile new assembly plant and the uncertain future of a second, significantly, since the end of the recession in 1992, every major North American and Japanese vehicle assembler operating in the province has announced investments in new and upgraded plants together totaling over \$12 billion (Table 5).³

Although the transportation equipment industry stands out as the leader in Ontario's manufacturing sector, a number of other industries are notable as well, either for their absolute size or their rate of growth over the 1990s, when measured in terms of Gross Domestic Product. These include the electrical and electronic products industry (at 11 per cent of manufacturing

³ A more detailed account of these issues can be found in (Gertler and Wolfe 2003).

GDP), the food industries (at slightly below 9 per cent of manufacturing GDP), fabricated metal products and chemical products (both just under 8 per cent of manufacturing GDP) (Table 4). The plastics, furniture, and rubber industries, although constituting relatively small proportions of the total manufacturing sector, grew at dramatic rates (62, 62 and 75 per cent respectively) over the course of the decade. One other industry is also remarkable for its overall rate of growth in this decade and its relative contribution to the total increase in manufacturing GDP. The electrical and electronics products industry (including telecommunications) clearly rivals automotive products as the dynamic engine powering the growth of the manufacturing sector over the 1990s. It is the only industry that both grew at a faster rate than the transportation equipment sector (81 versus 78 per cent) and accounted for the second-largest share of increase in total manufacturing GDP (22 per cent) behind the transportation equipment sector. This result is not surprising given the critical role of electrical products as the enabling technology in the emerging information technology paradigm (Table 6).

Despite the apparent consistency in the relative shares of the leading manufacturing sectors in Ontario over the past four decades, there is also evidence to suggest that new and emerging industries are gradually assuming a more important status. The data cited above indicate that the fastest growing sector over the past decade, after transportation equipment, has been the electrical and electronics sector, which would rank even higher if it were to include software and computer services, usually counted in the service sector in the GDP figures. Ontario's information technology industries include more than 8,000 firms employing 300,000 people, largely concentrated in four key industrial clusters, Ottawa, the Greater Toronto Area, Hamilton and Kitchener-Waterloo (Beckstead et al. 2003). The sector draws its strength from a strong research infrastructure that includes the laboratories of the National Research Council in Ottawa, federal Networks of Centres of Excellence and Provincial Centres of Excellence and a dense network of forty-two post-secondary institutions that produce more than 6,000 graduates a year in computer science and engineering, as well as 5,000 ICT technicians from the community colleges. Over the past decade and a half, both the federal and provincial governments have stimulated the growth of the sector with a range of supportive tax and direct expenditure policies (surveyed below). The sector has notable concentrations of expertise in key sectors including telecommunications, photonics, software development, e-business, wireless communications and computer animation, led by key anchor firms, both domestic and foreign, with a strong research capacity in each of these fields – Nortel, JDS Uniphase, Alcatel IBM, Open Text, Cognos, Research in Motion and Alias Wavefront.

The popular impression is that the sector was severely battered by the post-2000 downturn in ICT spending, but this overlooks the highly differentiated impact of the decline. The overall decline in the sector masks a significant difference in the performance of the manufacturing and service sectors. During 2001, output in the ICT manufacturing sector decreased by 25.2 per cent while output in the ICT services sector actually grew by 12.3 per cent over the same period according to Statistics Canada. When measured against the longer period since 1997, the ICT sector as a whole has experienced an annual growth rate of 14.1 per cent compared to an annual growth rate of 3.5 per cent for the economy as a whole (Industry Canada 2002). The impact of the downturn was most marked in the area of R&D spending. Led by the telecommunications sector, predominantly based in Ontario, industrial R&D spending in Canada actually declined in 2001, the first year-over-year drop since the 1960s. Nortel's R&D spending alone fell by nearly \$1 billion in 2001 with a further reduction forecast for 2002. Overall telecommunications R&D spending was forecast to decline by 23 per cent in 2002 (Research Money 2002b). Key players in

the sector remain optimistic about its capacity to weather this downturn and position them to take advantage of new opportunities once the recovery is underway. They are drawing upon the province's strong technological infrastructure for support in this regard. Of crucial significance for the sector's future prospects is the high-quality, publicly funded system of colleges and universities, which offer world-class degree programs in electrical and computer engineering, computer science, and related fields.⁴

Another critical sector, although considerably smaller in overall size and economic significance than the ones discussed above the biotechnology sector, which is anticipated to be a high growth area in the future. Ontario has the third largest concentration of dedicated biotechnology firms in North America with over 119 biotechnology companies (representing 29 per cent of the national total) and twenty-one research institutions employing over 2,500 research scientists. Most of the startup firms in biotechnology are spun off out of university-based research. There are three significant concentrations of biotechnology firms in Ontario in Toronto, Ottawa and London. Toronto has the strongest concentration of firms with fifty and its bio-medical research output ranks fourth in North America, largely as a result of the University of Toronto and its affiliated teaching hospitals. It has developed specific research strengths in bioinformatics and genomics. One of the indicators of the strength of the sector is the inflow of both private investments and venture capital financing. Recent figures indicate that Toronto led the country with \$1.1 billion in private placements in 2001, representing 62 per cent of the national total, but only \$45 million in venture capital financing, ranking third after Vancouver and Montreal (Niosi and Dalpe 2003). However, a key issue with most of the biotechnology firms in Ontario, and the rest of the country, is that most of them are still in start-up or early development phase and relatively few have fully developed products on the market. Even a relatively established firm like NPS Allelix has only a few products in Phase 3 clinical trials and they are still several years away from the market. With a few exceptions, most firms will ultimately depend on a strategic alliance with an established pharmaceutical firm to ensure that the products successfully make it through the long pipeline of development, clinical trials, regulatory approvals and into production. A major draw for the inflow of foreign firms into Canada is to access the intellectual outputs of 'star scientists'.⁵ For instance the US firm Amgen set up its Amgen Institute at the Ontario Cancer Institute to access the research results of one of the University of Toronto's leading researchers, Professor Tak Mak. In return for funding a six-person laboratory, the firm obtained a right of first refusal on discoveries generated in the lab (Voyer 2001). While the strong research base, supportive policy environment, growing number of firms and inflow of financing indicate that the sector has much promise, it may be a long time before the full impact of this potential is realized.

Alternative approaches to economic development policy

Managing the transition to a more competitive global economy and inflationary macroeconomic environment was a challenge faced by all of the industrial economies in the 1970s and 1980s. Concerns with industrial policy as a separate focus of economic development policy emerged at the centre of the policy agenda during this transition. In this context, the declining efficacy of

⁴ For a more detailed discussion of recent developments impacting this sector, cf Wolfe 2002b and Gertler, and Wolfe 2003.

⁵ For a more detailed discussion of the importance of 'star scientists' to the Canadian biotechnology industry and their distribution across the country, cf Queenton and Niosi 2003.

Keynesian macroeconomic policies, combined with the loss of competitiveness in key industries and sectors, led governments to explore a wide array of alternative policy instruments, particularly some mix of industrial policies. The attraction of industrial policies was also stimulated by the growing fascination with the more interventionist approach to economic recovery and growth pursued after the war in France and Japan in comparison to that of the Anglo-Saxon democracies (Chandler 1986, 171). In Canada, the issue of industrial strategy was debated intensely during the period of greatest economic adjustment, from the onset of the oil first crisis in 1973 to the end of the post free trade debate in the 1988 federal election. However, the debate was clouded by terminological confusion over a number of related concepts. In his overview of the subject for the Macdonald Royal Commission on the Economic Union and Development Prospects for Canada, André Blais defined industrial policy as, “the set of selective measures adopted by the state to alter industrial organization.” The various instruments deployed to implement industrial policies include: tax incentives, direct financial subsidies, technical assistance, government procurement, import protection and occasionally, public enterprise (Blais 1986b, 4–5; Leiss and Smith 1990, 114). While this definition is reasonably clear, confusion arises over the distinction between industrial policies and industrial strategy, while other authors focus more on the problem of industrial adjustment for, or assistance to, declining sectors (Chandler 1986; Trebilcock 1986; Tupper 1982).

A useful analytical distinction was offered in a study prepared for the Ontario Economic Council by Paul Davenport and his collaborators. They defined industrial policy as “any government program that directly affects the economic activity of an industry, company or plant. Industrial policies are designed to change economic structures, behaviour, and/or performance.” They distinguished between two types of industrial policies: interventionist or non-interventionist. Interventionist policies can be classified as innovative, defensive and adaptive. Innovative policies promote growth and development, primarily by fostering the adoption and diffusion of new product and process technologies; defensive policies are reactive in their attempt to protect firms, sectors or regions against undesired economic changes; and adaptive policies attempt to ease the adjustment process by reallocating capital and human resources away from declining economic activities.” An industrial strategy in contrast involves a more comprehensive package of policies that comprise a conscious plan with respect to the organization and nature of industrial activity (Davenport, Green, Milne, et al. 1982, 1–2).

A related definition is offered in Michael Atkinson and Bill Coleman’s widely cited study of industrial policy. They reduce the broad typology outlined above to two basic categories: anticipatory and reactive. Anticipatory policy emphasizes intrusive policy instruments that are integrated with each other and focus on promoting a structural transformation of the economy, while reactive policy is organized around the immediate needs of specific firms and tries to promote a climate attractive to investment. The goal in industrial policy is to manage the changes faced by industry and allow for an orderly process of economic adjustment in response to the pressures of industrial restructuring. The key issue for industrial policy, according to Atkinson and Coleman, is which aspect of the objectives to stress: anticipatory policy stresses the adjustment aspect, while reactive policy focuses more on the protectionist element. The second dimension along which industrial policies can be distinguished is the extent of intrusiveness. Reactive policy tends to operate more at the framework level, by deploying a broad range of general measures, including tax, subsidies or protectionist trade programs to create an appropriate investment climate. Anticipatory policy focuses more on selective intervention to influence the process of industrial restructuring targeted to the needs or requirements of specific industrial

sectors. Finally, the policy modes can be distinguished by their relative degree of integration. Reactive policy tends to consist of a series of ad hoc measures focused on individual firms or sectors as the case demands, while anticipatory policy is more comprehensive and attempts to evaluate all firms and sectors against a broad set of bureaucratic and political criteria (1989, 23–25).

The debate over the advisability of industrial policy became highly polarized in the late 1970s and early 1980s between alternative positions staked out by two advisory councils to the federal government – the Economic Council of Canada and the Science Council of Canada. The Economic Council’s position stressed the long-term economic costs of most forms of protectionism adopted in Canada and urged the move towards greater trade liberalization, especially as the international economy evolved towards larger regional trading blocs. The pursuit of a trade-led adjustment strategy through preferred access to the US market seemed highly desirable from this perspective. The alternative position was staked out in a number of reports going back to the early 1970s published by the Science Council which stressed the long term costs of a lack of technological sovereignty and urged the federal government to adopt a more proactive or anticipatory approach to increasing the technological capability of Canadian firms. In several studies published in the late 1970s, the Science Council identified technological sovereignty as the cornerstone for an industrial strategy. It argued that, “a nation can be said to be technologically sovereign when it has the ability to develop and control the technological capability necessary to ensure its economic, and hence its political, self-determination” (Science Council of Canada 1979, 14). It specified four lines of action that would contribute to the formation of an industrial strategy based upon the goal of technological sovereignty:

- 1) increasing the demand for indigenous Canadian technology;
- 2) expanding the country’s potential to produce technology;
- 3) strengthening the capacity of Canadian firms to absorb technology;
- 4) increasing the ability of Canadian firms to import technology under conditions favourable to Canadian industrial development (1979, 48; Britton and Gilmour 1978, 166).

The Royal Commission on the Economic Union and Development Prospects for Canada (Macdonald Commission) undertook what was probably the most comprehensive survey of these issues in the numerous background studies it commissioned. One attempt to integrate both the technological concerns of the Science Council and the trade-led adjustment approach of the Economic Council was the background study prepared for the Macdonald Royal Commission by Richard Harris. According to Harris, a technological perspective on trade and economic development leads to a key conclusion: “*The social incentive to subsidize Schumpeterian industries is greater in a small open economy than in the large closed economy*” (Harris 1985, 105). The small economy has more reason to be concerned with receiving its share of the benefits from technological spillovers related to innovation. Further, the smaller firm size on average, which results in a suboptimal industrial structure for the purposes of investing in R&D and innovation, indicates that the total resources devoted to these purposes in the economy may be less than is socially optimal. For these reasons, and because of the high barriers to entry that may exist in industries dominated by Schumpeterian competition, small open economies need to focus on promoting the growth of industries that specialize in product differentiation as opposed to scale economies. Policy should also provide substantial support for small and medium-sized enterprises, given the

greater innovativeness of these firms. The most effective way to intervene is to provide support directly to individual firms, rather than sectors or consortia, just as they are entering export markets. Harris suggested that the best policy instruments to achieve these goals were greater support for R&D through tax incentives, direct subsidies, loan guarantees or government procurement; and the explicit subsidization of lower cost loans in the capital markets (1985, 106, 138).⁶

In two substantive chapters of its final report, the Commission explored the relationship between technological change and economic growth and the literature on industrial policy in extensive detail. It cited approvingly the study by Harris and noted its strong endorsement of increased support for R&D through some combination of tax incentives, direct subsidies, loan guarantees or procurement policies. In their own comment, however, the Commissioners went on to suggest that Harris' "arguments require attention, but not necessarily an immediate policy response" (Canada, Royal Commission on the Economic Union and Development Prospects for Canada 1985, 106). However, the Commissioners were much less sanguine about the prospects for industrial policy. They noted the diverse array of conflicting opinions presented to them by a variety of different groups that made submissions. Drawing upon the extensive background studies that had been conducted, they discussed the diversity of approaches to industrial policy adopting a very broad definition of what constituted industrial policy. They noted the strong recommendation in favour of a more interventionist approach presented in the Harris study, but concluded,

In view of the practical difficulties of developing a targeted approach to industrial policy, this commission does not recommend such an approach for Canada. . . . *The fact that many of the components of industrial policy are under provincial or federal-provincial jurisdiction is a further argument against attempting to pursue a closely orchestrated industrial policy.* . . . In our judgment, Canada's approach to industrial policy should become more highly-market-oriented than it is at present, rather than move toward still more government intervention (emphasis added) (Canada, Royal Commission on the Economic Union and Development Prospects for Canada 1985, 184).

They went on to suggest that in a small open economy, such as Canada's, industrial policy and trade policy are almost synonymous, thus leading directly to their recommendation that a key component of Canada's industrial policy should be a commitment to freer trade – if not free trade – with the United States. This official pronouncement by the Macdonald Commission effectively ended the debate over industrial policy in this country in favour of a trade-led adjustment strategy.

In the eyes of most commentators, in practice, Canada followed the reactive approach to industrial policy throughout the 1970s and 1980s. The policy tools that were deployed consisted of various forms of assistance to facilitate industrial adjustment. However, this approach was criticized from both sides of the spectrum. The critique from the right was especially categorical, in its judgment. The bulk of the industrial policies deployed in this period (aside from tariffs), were various forms of adjustment policies. The onset of stagflation in the 1970s increased the

⁶ A useful overview of the debate between these two perspectives, as well as Harris' synthesis, is provided in (Blais 1986a).

pressure on governments to provide more focused firm-based and sectoral adjustment policies. Among the most visible was the assistance afforded to large corporation on the verge of collapse, including Chrysler, Massey-Ferguson, and the notorious Maislin Trucking; the unending subsidies to Canada's two aircraft assemblers after their absorption into the Canada Development Corporation; and the broader assistance to restructuring in a number of vulnerable sectors, such as textiles, shipbuilding and pulp and paper under the auspices of the Industry and Labour Adjustment Program and the Canadian Industrial Renewal Board. In the eyes of the critics, the original rationale for creating many of these programs had been lost by the early 1980s, and the ability of government to control their cost abandoned (Ritchie 1983, 43–45; Trebilcock, Chandler, Gunderson, et al. 1985). From the left, the primary criticism centred on the failure to adopt a more innovative or anticipatory approach and the repeated inability to formulate a more coherent plan or industrial strategy, despite the series of consultative exercises launched in the late 1970s and the infamous mega-projects episode of the early 1980s.⁷ In the words of one critic, the upshot of this failure indicated that successive federal governments in Canada “simply lacked the political will to bite the industrial strategy bullet and move beyond the traditional economic policies that . . . shaped the present chronic export, balance of payments, and employments crises” (Williams 1983, 166).

Some commentators pointed to a wider range of factors that constrained the scope for Canadian industrial policy in this period. In her analysis of the *political* factors that explain the pattern of state intervention in providing assistance to industry, Marsha Chandler concluded that Canada lacked most of the key institutional features, on both the public and private sides, found in those countries that adopted more effective forms of public assistance to industry. On the bureaucratic side, the federal government lacked a single ministry with a strong interest in playing the lead in this area and an effective political constituency that would give it the incentive to do so. On the private side, the organization of the banking system did not provide the mechanism for the financial sector to play the lead role in promoting industrial adjustment the way it did in some European countries. The fragmented nature of both the business organizations and the labour movement also tended to produce endless ‘wish lists’ of sector or firm-oriented subsidies, rather than a cohesive framework, as in the case of the Tier I and Tier II consultations of the late 1970s. In conclusion she argued

In sum, Canada's institutional structures, banking system and public-private sector relationship decrease the probability that a state-led adaptive capacity will be developed. Organization at the federal level, the absence of adequate federal-provincial arrangements, and the autonomous banking system make it less likely that restructuring policies will be supplied; the fragmented organization of private-sector interests makes it unlikely that such policies will be demanded (Chandler 1986, 205).

Atkinson and Coleman effectively concur in their detailed study of industrial policy in the 1980s. The dominant factor in explaining the inability to forge a consensus around a broadly-based, anticipatory industrial strategy is the weakness of what they term the ‘state tradition’ in Canada's parliamentary system of government,

⁷ A number of excellent accounts exist of the several rounds of deliberation over industrial policy that occurred at the federal level during this period. More detailed accounts can be found in French 1984, ch. 6; Brown, Eastman, and with Robinson 1981; Doern 1983.

It is hard to over-emphasize the importance of state tradition for the conduct of industrial policy. Where state tradition is weak, state institutions often reflect the interests of the strongest organizational forces in society. Much of the state's apparatus is devoted to transmitting and responding to these demands. And because these demands are conflicting, and state structure under these circumstances is generally inchoate, industrial policy is typically a confusing amalgam of reactive policy initiatives (1989, 56).

The preceding analysis attributes the failure of Canadian efforts at industrial policy to the institutional weakness of governmental structures and the absence of effective public-private sector coordinating mechanisms. However, other commentators observed that it fails to account for the federal dimension of Canadian politics. In a paper prepared for the Science Council in 1979, Richard Simeon identified the "regional challenges to industrial policy". The institutions of the federal system accentuate this regional dimension of public policy by structuring the political life of the country around the interplay between regional and national forces. Growing tensions between the two levels of government create a situation where each advances competing development strategies, making the formation of a national strategy difficult. An additional factor complicating the situation is that no one government controls all the policy instruments needed to implement a cohesive strategy. In fact, it is the provinces, rather than the federal government, which exercise primary jurisdiction over a number of the areas crucial for industrial policy. This underlines the interdependent nature of federal and provincial jurisdiction. The clear implication of his analysis is that a national strategy cannot be the product of the federal government alone; it requires the cooperation of both levels of government. In concluding, he suggested that it would be very difficult to create the conditions required for a new, more collaborative form of industrial strategy could emerge (Simeon 1979; Tupper 1982, 79–92).

Michael Jenkin expanded on these themes in his survey of the range of industrial policies adopted by most of the provinces in the late 1970s and early 1980s. As they became more expert at promoting the industrial expansion of their own economies, this created a need for greater collaboration and coordination – federal-provincial, inter-provincial and bilateral. The most difficult level to manage was the federal-provincial one for all the problems identified with respect to intergovernmental coordination. These trends underlined the need for new mechanisms to resolve conflicts in this area and new means to promote greater collaboration, particularly measures to ensure that regional perspectives were reflected adequately in federal policy initiatives and that industrial planning was given a more integrated institutional base within the federal government (Jenkin 1983, 169–81).

The institutional shortcomings described above, which were widely perceived as limiting Canada's capacity to implement industrial policies in the 1970s and 1980s, may no longer be liabilities in the same way. As the economy has undergone dramatic changes in the past two decades with the shift to more knowledge-intensive forms of production in both the goods producing and service sectors, the institutional requisites for economic development policy have changed accordingly. This shift has altered the relationship between the economy and geography in ways that affect the respective roles played by the different levels of government, as well as the relationship between public and private sector actors. We begin to explore this shift with an examination of the implications of the emerging knowledge-based economy at the outset of the 21st century and continue with a survey of trends in federal and provincial policy to support innovation over the course of the 1980s and 1990s.

Part 2: Innovation in the Knowledge-Based Economy

The rapid pace of technological change over the past decade and a half portends even more dramatic changes yet to come – in new technologies, new products and whole new industries – witness the rapid integration of the computer, telecommunications and multimedia industries and the lightning transformation of the World Wide Web from an elite tool for scientific research into a device for the complete transformation of business processes. Over the past decade, key policy bodies, such as the OECD, and many national governments, have come to view the emerging digital economy as essentially a knowledge-based one. This follows from the central role that knowledge-based activities play in the production process, as well the rising proportion of the labour force that deals with the production, distribution and processing of information and knowledge in comparison to the proportion that handles tangible goods. If knowledge is understood to include not just R&D, but also design, engineering, advertising, marketing and management, then knowledge-based inputs are becoming the defining feature of both manufacturing and service industries in the new economy (OECD 1996a).

The tendency to identify or label the emerging economy as ‘knowledge-based’ has given rise to a much broader reappraisal of the role of knowledge in economic growth and development. Though long neglected in mainstream economics, the role played by knowledge in economic transformation, and ultimately growth, is arguably one of the most important factors to understanding the new policy paradigm of economic development. This recognition of knowledge as a fundamental variable in the study of economic change flows from the tradition of evolutionary economists and new growth theorists, commencing with Schumpeter’s *Theory of Economic Development* (1928) and extended by Nelson and Winter’s *An Evolutionary Theory of Economic Change* (1982) and Paul Romer’s work on ‘increasing returns’ (1986, 1990, 1994), that place questions of innovation and knowledge accumulation at the centre of the analysis. At the core of this body of work lie several generalizations about knowledge, and the role of markets and institutions in capitalist development. At the most general is the recognition that the underlying basis of economies is transformed over time from the growth of knowledge (Metcalf, Foster, and Ramlogan 2002). New knowledge, coordinated through a decentralized system of markets and supported by an institutional framework, opens up new economic spaces, giving rise to new opportunities for economic growth. This process is thus an interactive one whereby the generation and application of knowledge both influences and is influenced by the structural changes of the economy. “New knowledge defines new combinations, entrepreneurship introduces these new combinations into the space of economic activities and those that pass the test of economic and social viability may spread further into the system attracting resources and demand and so enhancing or destroying the markets for existing activities” (Metcalf 2002, 5).

Central to this formulation is the insight that knowledge accumulation is fundamentally an unlimited process. Knowledge generates more knowledge as each development or activity gives rise to new possibilities, which further change the knowledge base. As a consequence, capitalism itself is restless as new knowledge is captured and transformed by firms into new opportunities, ultimately changing the relative importance of different economic activities. Products, industrial sectors, manufacturing processes, regions and at times, entire countries, all shift in their relative importance as a result of the ongoing interaction between knowledge accumulation, organizations and institutions (Metcalf 2001, 22).

Though knowledge has always been a part of economic processes, what is changing in the 'new economy' is the type of knowledge that is driving the growth of new industries. Production, as several studies have pointed out, is increasingly dependent on specialized, complex and scientifically intensive knowledge from a wide diversity of fields (OECD 2000). A 1997 study of paper citations in US patents, for example, found that such citations increased considerably between 1985 and 1995 in a range of technology sectors, from chemicals, electronic components to, particularly, biotechnology. Moreover, 73 per cent of papers cited in U.S. patents were from public science, suggesting that the importance of government support of science and technology is increasing (Narin, Hamilton, and Olivastro 1997). This trend is also apparent from the portion of complex technologies to world exports: by 1995, 82 per cent of the most valuable goods exported were complex technologies up from 43 per cent two and a half decades earlier (Rycroft and Kash 1999).

A consequence of this increasing dependence on the scientific frontier is that no one firm, let alone individual, can any longer be in command of the wide range of technological competencies needed for successful innovation. Indeed as technology has become more complex, firms have come to rely ever more on collaborations as a way of leveraging the escalating risks and costs of R&D in the face of mounting global competition (Coombs, Saviotti, and Walsh 1996). In addition to the increasing complexity of innovation, the underlying relationships of social learning are tied to research, product development and production. Research consortia, cross-licensing agreements, research contracts, for example, all have become essential forms of cooperation in helping firms access new knowledge, share development costs and associated risks, particularly in the more knowledge intensive sectors such as information technology and biotechnology. Between 1988 and 1992 U.S. firms entered into some 20,000 alliances (Rycroft, et al. 1999), and by 1998, alliances contributed to 25 per cent of the earnings of the top 1000 firms in the U.S (OECD 2000).

These collaborations – with firms, government agencies, research laboratories, and universities – have thus become a key variable to understanding economic success and consequently, have been an important focus of economic development policy. Their importance suggests that much of the useful knowledge in the innovation process is derived not only internally from within the firm and its employees, but also from its linkages to the market system, from its interactions with suppliers, customers or collaborators. Economically relevant knowledge is often context specific or 'local' (Nelson and Winter 1982), and made all the more so by the fact that much of the knowledge that is brought to bear on production processes is tacit (Teece 1981), and as such, not easily articulated or codified into readily transferable information. The easier and more inexpensive access to information tends to reduce the economic value of more codified forms of knowledge and information. Conversely, forms of knowledge which cannot be codified and transmitted electronically (ie. tacit knowledge) increase in value, along with the ability to acquire and assess both codified and tacit forms of knowledge, in other words, the capacity for learning.

Knowledge accumulation is therefore an intrinsically uneven process, both spatially and temporally. Indeed, far from being a steady process through time, it accumulates at an unpredictable rate as new knowledge spawns new innovations, giving rise to further opportunities for more innovation. The process, in effect, creates a clustering of new knowledge in time for any given technology group. For regional economic development, these knowledge dynamics have significant implications for the design of policy. They help explain the regional emphasis in new economic development initiatives, as well as the recent push by national and subnational

governments to involve a wide range of actors in economic development strategies, in order to benefit from their local knowledge in a bid to compete more effectively in global markets.

Learning through networks of social relationships

If knowledge is the most valuable resource in the modern economy, then learning is the most important social process according to Lundvall's seminal work on innovation systems (1992). Learning here refers to the building of new competencies and the acquisition of new skills, not just gaining access to information. In a world where knowledge and information are both becoming more valuable and increasing at a rapid rate, the greatest threat faced by economic actors is the constant devaluation of their existing stock of knowledge (Lundvall 1998, 408). The capacity to learn is thus essential for maintaining access to, and control over, the rapidly expanding knowledge frontier in the understanding that an existing stock of knowledge assets affords but a fleeting competitive advantage. It is the capability of individuals, firms, regions and nations to learn and adapt to rapidly changing economic circumstances that will determine their future economic success in the global economy (Lundvall and Borrás 1998). Yet as Lundvall stresses, learning, far from being an individual affair, is fundamentally an interactive process that always requires the presence of networks (1992). Indeed, both Freeman (1987) and Lundvall (1992) emphasize the relative importance attached to the patterns of interaction between firms as part of a collective learning process in the acquisition and use of new technical knowledge. This flows from their belief that innovation is increasingly tied to a process of interactive learning and collective entrepreneurship, especially in terms of the relationship between producers and users of new technology.

The importance of learning draws our attention to the important role played by institutions in channeling the rate and direction of innovation in the economy. Institutions are taken to be the complex of customs, habits, norms and conventions that prescribe behavioural roles, constrain activity and shape expectations. At their broadest level, institutions incorporate social roles based on established norms and expected patterns of behaviour, thus precluding the necessity for individuals to relearn their social roles anew everyday. They operate as an important mechanism for transmitting information about accepted norms and expected patterns of behaviour to the members of society. From the perspective of evolutionary economics, institutions play specific roles in the functioning of an economy. They reduce uncertainty in everyday life by forming patterns of interaction and shaping the way individuals view and understand society. Institutions are central to the process of learning discussed above. Learning processes are inherently social and interactive, not just individual, and new knowledge is created through processes that are institutionally embedded. Institutions also provide basic functions for the operation of economies. "They provide information, reduce uncertainty, manage conflicts and cooperation, and create incentives and trust. These functions not only give stability and structure to the economy, they are also crucially important for innovation. All innovative activities are riddled with uncertainty and in the modern economy there are many institutions to assist in coping with the technical and financial uncertainties of innovation" (Johnson and Nielsen 1998, xiii-xv).⁸

⁸ For a fuller treatment of these issues, see the discussion in (Wolfe and Gertler 2002).

The systems of innovation approach

The 'systems of innovation' approach has been applied by a growing number of scholars to analyze the network of relationships among firms and the broader institutional setting that supports their innovative activities; it emphasizes the dynamic and cumulative nature of the innovative process. Analyzing these relationships involves tracing the flows of knowledge among institutions, both public and private, that comprise this innovation system. Studies of the innovation process point to the interdependence of economic, political, and cultural factors, and the increasing importance of proximity in influencing the innovation process.

Though the concept of the innovation system was pioneered by Chris Freeman's study of technological change in the Japanese economy, its conceptual roots stem from Friedrich List's (1841) theory of national systems of production which took into account the importance of a wide range of national institutions (Freeman 1997; Edquist 1997; Lundvall, Johnson et al. 2002). Freeman defined systems of innovation initially at the national level as "the network of institutions in the public and private sectors whose interactions initiate, import, modify and diffuse new technologies" (Freeman 1987, 1). He underlined the role of social and political institutions in supporting the adoption and dissemination of scientific and technical knowledge. His study of the Japanese system of innovation analyses the contribution of four key components: the role of government policy; the role of corporate R&D; the role of the education and training system; and the general structure of industry. In a refinement of the concept, Lundvall generalized the systems of innovation concept further, defining it as being "constituted by elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge and that a national system encompasses elements and relationships, either located within or rooted inside the borders of a nation state" (1992, 2). The innovative performance of individual countries is therefore influenced by the way in which elements of this institutional ensemble interact in the creation and application of knowledge. Lundvall and his Danish collaborators suggest it is helpful to think about two related dimensions of the innovation system. The first involves the structure of the system – what is produced in the system and what innovative competencies are involved in producing these; the second involves the institutional make-up of the system – the ensemble of non-market forces that shape and condition the way in which production and innovation occur (Lundvall, Johnson et al. 2002, 220).

A third approach to the concept is provided in the collaborative study of innovation systems across fifteen nations edited by Richard Nelson (1993). In his overview of the key findings of the comparative and cross-national study, Nelson argued that the use of the concept of 'system' to analyze the innovative performance of firms and nations draws attention to the role of a "set of institutional actors that, together, play the major role in influencing innovative performance" (Nelson 1992, 349). His analysis of the comparative results of the study singles out a key set of institutional actors that play a central role in this system. Among those identified are corporate research and development laboratories, the role of universities, or scientific and technical education structures more generally, and the role of governments, and in particular their policies designed to influence the rate and pace of innovation. In comparing the factors that exerted the strongest influence on the innovative performance of national systems in the fifteen countries studied, Nelson singles out the extent of interactive linkages among firms and their upstream suppliers; the role of the education and training system in providing firms with a steady flow of workers with the needed skills and knowledge; the contribution of publicly supported universities and public research laboratories, as well as a wide and diverse range of government programs.

Overall, he concludes that the range of institutional structures supporting innovation vary across national systems as a result of the considerable differences in their respective traditions and their developmental trajectories (Nelson 1992, 373–74).

Nelson's conclusions concerning the essential elements of the national innovation system are broadly supported by a number of other analysts (Patel and Pavitt 1994, 79–80; Metcalfe 1997, 286). Stan Metcalfe agrees with the preceding typology of institutions that make up the national innovation system, but sees the role of government as central to its operation. He defines it as “that set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process” (1997, 285).

Governments play a central role in ensuring the coordination of the different elements that constitute the national innovation system, especially with respect to striking a balance between the operation of the science system, which is not profit oriented and is motivated by the search for new discoveries, and the world of technology, which is driven by the profit motive and operates with a much shorter time horizon. The process of innovation constantly introduces new technologies with the potential to generate higher than average social and economic returns. However, as noted above, both the long time horizon required to reap the benefits of investing in these technologies, and the fact that the social returns to investment in these technologies are likely to exceed the privately appropriable returns may result in an underinvestment. Furthermore, the enabling character of these technologies, i.e. their capacity to generate important economic benefits for other sectors of the economy, also generates social and economic benefits that extend far beyond the sectors most directly affected. Conversely, an inadequate rate of investment in these technologies as a result of purely market-based incentives may reduce the social benefits that they could bring. Equally important are policies that support and enhance the absorptive capacity of firms – namely the ability to develop and adopt new or existing technologies that may contribute to the firm's competitive position. This challenge provides the policy rationale for a greater interest on the part of governments in innovation-oriented policies focused on the new technologies and high growth sectors that produce the enabling technologies with the potential to increase output and productivity levels across a wide range of the economy (OECD 1992, 59–63).

A key challenge for government policy involves ensuring the appropriate mix of skills and resources between the two sectors. However, the solutions to this challenge vary considerably across national systems, as no two countries enjoy exactly the same mix of innovative resources in the component elements that constitute their respective innovation system. The diversity of national innovation systems is strongly conditioned by the different roles played by key actors and both the form and quality of their interaction. A critical factor that determines the relative effectiveness of different innovation systems is the degree of connectedness between the components and the ease or fluidity with which applicable knowledge, scientific discoveries and the highly skilled resources to staff the innovation system flow across the different elements of the system (OECD 1999, 22–25).

Regional innovation systems

The increasing attention on the importance of tacit knowledge and the role of ‘untraded interdependencies’ in supporting the innovative capacity of firms, the literature on innovation

systems shifted focus from the national to the regional level. In so doing, the framework could take into account the observation that the development of new innovative capabilities is often location-based – it occurs in a specific geographic locale and displays a strong regional component. Given the social nature of learning and innovation, it is not surprising that these processes work best when the partners involved are close enough to allow frequent interaction and the easy, effective exchange of information. Recent work has explored how innovative capabilities are sustained through regional communities of firms and supporting networks of institutions that share a common knowledge base and benefit from their shared access to a unique set of skills and resources. At this level, it emphasizes that competitive advantage is no longer limited to the acquisition of codified knowledge and capital that are available world wide; it is more dependent on the institutional and social capital that fosters the acquisition and use of both explicit and tacit knowledge. To a growing extent, both the institutional and the social variables that support this capacity are grounded in regional and local economies (Wolfe 1997).

The reasons for this are threefold. Spatial proximity facilitates frequent, close and (most commonly) face-to-face interaction. Such interaction, both planned and formal, and unplanned and informal, enables learning-through-interaction (Maskell and Malmberg 1999). Second, firms clustered in the same region often share a *common regional culture* that can act to facilitate the process of social learning. Research indicates that such firms build a common language or code of communication through repeated interaction over time. Because much of the most important knowledge transmitted between parties in the innovation process is *tacit* rather than codified, this characteristic confers a crucial advantage on firms that participate in such networks of exchange (Gertler 1997). Finally, this interaction-facilitating common language or code of communication is further supported by the creation of *regional institutions* that help to produce and reinforce a set of rules and conventions governing local firms' behaviour and inter-firm interaction.

The constellation of institutions at the regional level that contribute to the innovation process is identified as the *regional innovation system* (Braczyk, Cooke, and Heidenreich 1998) in a manner analogous to the concept of the national innovation system. Central to the idea of the regional innovation system (RIS) is the notion of how the institutional and cultural environment of a region either supports or retards the innovation process. This is defined as “the set of economic, political and institutional relationships occurring in a given geographical area which generates a collective learning process leading to the rapid diffusion of knowledge and best practice” (Nauwelaers and Reid 1995, 13; Cooke 1998). However, regional innovation systems should not be conceived of as merely geographically delimited versions of the national innovation system. The focus on the regional derives from the observation that regions evince distinct differences in terms of their industrial structure, research and technology infrastructure, training and educational institutions, policy supports, broader governance structures and relationships between key actors in the innovation system (Oughton, Landabaso, and Morgan 2002, 101). It also flows from the recognition that regional governments control a radically different array of policy instruments than the senior levels of government with correspondingly different implications for the processes of innovation and economic development. This concern with the regional level, however, raises the question of how to define a region. Recent work draws an important distinction between two types of regions: ‘cultural’ and ‘administrative’. Cultural regions share certain features in common with “the classical definition of nation as a people sharing a common culture, language and territory but which either have not become states (e.g. the Basque Country) or forfeited that status (e.g. Scotland)”, while the latter category includes subnational areas of jurisdiction within larger federal systems, such as the German Länder or US

states, or newer forms of regional government within traditionally centralized democracies, such as France or Italy. All such regions are defined as “territories smaller than their state possessing significant supralocal governance capacity and cohesiveness differentiating them from their state and other regions” (Cooke, Uranga, and Etxebarria 1997, 479–80).

As in the case of national systems, the role played by the public sector is central to the operation of the regional system of innovation, although the relevant institutions and policies, and the way they are deployed, have changed considerably in recent years. The expanded role played by subnational governments in promoting these relations stems, in part, from the growing economic significance attached to geographically based networks of firms and knowledge-creating forces, discussed above. In a growing number of instances, the regional level of governance is assuming the role of social animator or facilitator of the desired forms of innovative activity, “. . . the elaboration of regionalized or localized public-private interfaces adds substantially to the performance of regional economies by enabling SMEs (small and medium-sized enterprises) to meet more effectively the requirements of their customers in respect of technology, quality and training” (Cooke and Morgan 1993, 552).

The most dynamic regional levels of government have experimented over the past two decades with a wide range of innovation policies. Differences in economic performance between the relatively more or less successful regions have prompted a corresponding interest in the mix of regional innovation policies and institutions that foster this dynamism. A critical component of the innovation system of a region is the infrastructure of R&D institutions located within it as well as the internal and external networks of relationships within and between public agencies and private actors. A number of recent schematics have been proposed to describe the RSI. One of these suggests that the regional innovation system for a region should be conceptualized in terms of both the demand and supply side for innovation. On the supply side are located the institutional sources of knowledge creation in the regional economy. Closely linked to these are the institutions responsible for training and the preparation of highly qualified labour power. The demand side of the system subsumes the productive sector – firms which develop and apply the scientific and technological output of the supply side in the creation and marketing of innovative products and processes. Bridging the gap between the two are a wide range of innovation support organizations, which play a role in the acquisition, and diffusion of technological ideas and know how throughout the innovation system. These may include technology centres, technology brokers, business innovation centres, organizations in the higher education sector which facilitate the interface with the private sector and mechanisms of financing innovation, such as venture capital firms (Nauwelaers, et al. 1995, 15–16).

Clusters

With the economic success of spatially concentrated regions of firms in such places as Palo Alto and Italy’s northeast, regional clusters have come to capture considerable attention by both academics and policy makers. Michael Porter defines a cluster as “a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities” (Porter 1998, 199). They include concentrations of interconnected companies, service providers, suppliers of specialized inputs to the production process, customers, manufacturers of related products and finally governmental and other institutions, such as national laboratories, universities, vocational training institutions, trade associations and collaborative research institutes. Clusters can consist of both high-tech

concentrations of firms, which often centre around research intensive universities, as is clearly the case in Silicon Valley, as well as those based in more traditional industries, such as the ones studied by Maskell and his colleagues in Denmark (Maskell, Eskelinen, Hannibalsson, et al. 1998).

Porter, best known for his work on competitive advantage, provides a compelling analysis of the way in which the existence of clusters affects competition. The first is by increasing the productivity of their constituent firms and industries. Location of a firm within a cluster contributes to enhanced productivity by providing it with superior or lower cost access to specialized inputs, including components, machinery, business services and personnel as opposed to the alternative, which may involve vertical integration or obtaining the needed inputs from more remote locations. Clusters also offer distinct advantages to firms in terms of the availability of specialized and experienced personnel. The cluster itself often acts as a magnet drawing the skilled labour to it. Conversely the location of specialized training and educational institutions within the cluster can provide a ready supply of new labour for firms in the cluster. Clusters also enhance productivity by facilitating the complementarities that exist between member firms. Membership in the cluster makes it easier for participants to source needed parts and components, thus enhancing the technological and productive capabilities of members firms.

The mutually beneficial activities of the firms in a cluster generate a number of cluster assets that can be viewed as quasi-public goods. The general level of knowledge and information built up in the cluster can act as such a good, if the level of trust is sufficient to generate an easy and mutual exchange of both tacit and codified knowledge. Similarly, the mobility of personnel between firms in a cluster can constitute a similar source of knowledge flows. Even more important, the strength of the cluster can provide an important stimulus to public investment in specialized infrastructure, such as communication networks, joint training and research institutions, specialized testing facilities and the expansion of public laboratories or post-secondary educational institutions. As the depth and value of such investments increase, so do the economic benefits flowing to firms located in the cluster. Thus the strength of the cluster and its supporting infrastructure of quasi-public goods and public institutions create a mutually reinforcing positive feedback loop (Porter 1998).

Knowledge and learning in clusters

Much of the literature on the economic benefits of clusters stresses the fact that the key advantages are derived from the agglomeration economies afforded by the cluster. These agglomeration economies arise primarily from the ready access afforded to firms by co-locating with key suppliers. While not diminishing the importance of these agglomeration economies, a more recent stream of analysis suggests that the underlying dimension, which confers competitive advantages on the firms located in the cluster, is ready access to a common knowledge base. The central argument in this literature is that the joint production and transmission of new knowledge occurs most effectively among economic actors located close to each other. Proximity to critical sources of knowledge, whether they are found in public or private research institutions or grounded in the core competencies of lead or anchor firms, facilitates the process of acquiring new technical knowledge, especially when the relevant knowledge is located at the research frontier, as in the field of biotechnology research, or involves a largely tacit dimension. Knowledge of this nature is transmitted most effectively through interpersonal contacts and interfirm mobility of skilled workers. From this perspective, “a key feature of successful high-technology clusters is related to the high level of embeddedness of local firms in a very thick

network of knowledge sharing, which is supported by close social interactions and by institutions building trust and encouraging informal relations among actors” (Breschi and Malerba 2001, 819).

Building on this stream of the literature, Peter Maskell has proposed a knowledge-based theory of the cluster, but extends this approach to both high technology and conventional clusters. He suggests the primary reason for the emergence of clusters is the enhanced knowledge creation that occurs along two complementary dimensions: the cluster affords firms benefits along a horizontal dimension through the reduced costs of coordinating dispersed sources of knowledge and overcoming the problems of asymmetrical access to information for different firms, as well as facilitating the actual flow of knowledge between firms along the vertical dimension. The horizontal dimension of the cluster consists of those firms that produce similar goods and compete with one another. The advantages of proximity arise from continuous monitoring and comparing what rival firms are doing, which acts as a spur to innovation as firms race to keep up with or get ahead of their rivals. The vertical dimension of the cluster consists of those firms that are complementary and interlinked through a network of supplier, service and customer relations. Once a specialized cluster develops, firms within it increase demand for specialized services and supplies. Further, once the cluster has emerged, it acts as a magnet drawing in additional firms whose activities require access to the existing knowledge base or complement it in some significant respect (Maskell 2001, 937).

A knowledge-based theory of the cluster necessitates an awareness of the fact that knowledge flows present in a cluster frequently involve a combination of both local and global sources. Bathalt, Malmberg and Maskell maintain that successful clusters are effective at building and managing a variety of channels for accessing relevant knowledge from around the globe. However, the skills required when dealing with the local environment are substantially different than the ones needed to generate the inflow and make the best use of codified knowledge produced elsewhere and these differences must be managed by the cluster. They maintain that an accurate model of the knowledge-based cluster must account for both dimensions of these knowledge flows (Bathalt, Malmberg, and Maskell 2002). They refer to these two kinds of knowledge flows as *local buzz* and *global pipelines* respectively. According to Storper and Venables buzz arises from the fact of physical co-presence. It incorporates both the broad general conditions that exist when it is possible to glean knowledge from intentional face-to-face contacts, as well as the more diffuse forms of knowledge acquisition that arise from chance or accidental meetings and the mere fact of being in the same location. Buzz is the force that facilitates the circulation of information in a local economy or community and it is also the mechanism that supports the functioning of networks in the community (Storper and Venables 2002, 32). In this context, it is almost impossible to avoid acquiring information about other firms in the cluster and their activities through the myriad number of contact points that exist. Pipelines, on the other hand, refer to channels of communication used in distant interaction, between clusters and external sources of knowledge. Important knowledge flows are generated through network pipelines. The effectiveness of these pipelines depends on the quality of trust that exists between the firms in the different nodes involved. The advantages of global pipelines derive from the integration of firms located in multiple selection environments, each of which is open to different technical potentialities. Access by firms to these global pipelines can feed local interpretations and the usage of knowledge that developed elsewhere into a cluster. Firms need access to both local buzz and the knowledge acquired through international pipelines. The ability of firms to access such global pipelines and to identify both the location of external knowledge

and its potential value depends very much on the internal organization of the firm, in other words, its 'absorptive capacity'. The same can be said of local and regional clusters (Bathalt, et al. 2002).

The relation between spatial scales

The preceding discussion of innovation systems and clusters raises the critical question of the most effective relationship between the levels of analysis – an issue that bedeviled both the debate over industrial policy in Canada and the attempts to apply different policy instruments at the appropriate spatial scale. Bunnell and Coe argue for a shift in focus away from forms of analysis that privilege one particular spatial scale as the basis for analyzing and understanding the nature of innovation towards those which emphasize the relationships that exist between and across the different spatial scales. They adopt the concept of 'nested scales' from Swyngedouw, but suggest that this should not be conceived in a hierarchical or deterministic sense, but rather as involving effects that can move in multiple directions across the scales (2001, 570).

Thus clusters can be seen as nested within, and impacted upon, other spatial units of analysis, including regional and national innovation systems, and the kind of global pipelines discussed above, each of which adds an important dimension to the process of knowledge creation and diffusion that occurs within the cluster. Various elements of each of these spatial levels of analysis may have significance for the innovation process. For instance the national innovation system, as analyzed by Nelson (1993) or Lundvall (1992) may play a preponderant role in establishing the broad framework for research and innovation policies, in establishing the rules of corporate governance that influence firm behaviour, in setting the rules of operation for the financial systems that determine the availability of different sources of financing for new and established firms, and finally in some settings, for setting the broad framework for the industrial relations, employment and training systems that influence job paths, interfirm mobility and skill levels for the labour force. Levels of regional specialization as encompassed in the concept of regional innovation systems play an important role in affecting cluster performance through the provision of the regional/state/provincial research infrastructure, specialized training systems, the broad education system, policies for physical infrastructure and the investment attraction function (Cooke, Uranga, et al. 1997; Cooke 1998). At the local level, levels of civic associationalism, particularly the business-higher education link, influence cluster development. The local level can also play an important role in the provision of infrastructure, such as roads and communication links, as well as in the governance of the primary and secondary education system.

We can see how these differing levels impact the performance of clusters clearly in the case of Silicon Valley. The cluster exists within the distinctive features of the US system of innovation – with its unique system of laws, regulations and conventions governing the operation of capital markets, forms of corporate governance, research and development and other relevant factors. A number of these features are absolutely central to the story of Silicon Valley's growth and development. Among these is the highly decentralized nature of the post-secondary education system with complementary and interlocking roles for both the federal and state governments. Changes introduced in the 1970s and 1980s in capital gains rates and the tax treatment of stock options, as well as the rules governing investments in venture capital by pension funds, stimulated the growth of the venture capital industry, a critical factor for the development of the ICT cluster. The federal government also played a central role as the initial customer for many of

the early products of the cluster. And finally, it was primary funder for much of the critical research and development that has underpinned the growth of these clusters (Rowen 2000). In recent years efforts by the local community to mobilize itself more effectively through organizations such as Joint Venture Silicon Valley have worked to enhance the degree of networking in the region and deal with some of the social and environmental problems that extensive growth has brought. Thus the concept of 'nested scales' of analysis deepens our understanding of the multiple factors that influence the development trajectory of a cluster and ultimately, its economic performance.

Innovation policy in Canada and Ontario

The Macdonald Commission's recommendation to pursue a free trade agreement with the US was followed closely by the successful conclusion of the Canada-US Free Trade Agreement, the North American Free Trade Agreement and the Uruguay Round of GATT negotiations in the late 1980s and early 1990s. As these new agreements came into effect, the policy focus at both the federal and provincial levels moved away from the specific questions of targeting high growth sectors or facilitating adjustment out of declining sectors to innovation policy. While vestiges of the earlier forms of industrial adjustment policy remained, most direct subsidies to industry were terminated with the federal budget of 1995 and the first financial statement of the new Conservative government of Ontario in July 1995. In their place, the earlier focus on industrial policy gave way to a broader concern with the way in which the process of technological change and innovation affect all sectors of the industrial economies. The ongoing research at the OECD and other international organizations made the economic justification for the adoption of innovation policies reasonably clear.

This perspective has gradually gained greater policy acceptance in Ottawa over the past two decades under both the Conservative and Liberal governments.⁹ Federal science and technology policy has undergone two major shifts in the past decade and a half – the first in 1987 with the introduction of the 'InnovAction' program by the Conservative government and the second in 1996 with the adoption of the results of the federal Science and Technology Review by the subsequent Liberal government. While the Conservative government is generally viewed as having pursued a neo-liberal trade and industrial adjustment strategy, symbolized by the Free Trade Agreement with the US, it also introduced a number of key initiatives in the field of technology and innovation policy. To some extent the federal government seemed to accept the argument of Richard Harris that the introduction of a free trade agreement without substantial efforts to enhance the innovative capacity of indigenous firms would fail to realize the full benefits attributed to such a policy. In 1987, the federal government launched its science and technology strategy, 'InnovAction'. The official goals of the program were to increase industrial innovation and technology transfer, develop and promote strategic technologies, manage federal science and technology resources more effectively, ensure the adequate development of human resources needed for science and technology and promote a more science-oriented culture in Canada (Dufour and de la Mothe 1993, 35–36).

The most innovative element in this strategy was the Networks of Centres of Excellence (NCE) program, which connects world-class researchers across the country from universities, hospitals and other centres in a series of joint research programs. The program was reviewed and extended

⁹ For a more detailed discussion of these trends, cf Wolfe 1999b; Wolfe 2002a.

in 1994, its funding was made permanent in 1997 (with \$47 million annual funding) and further additions to its budget were announced in February 1999. The 1999 budget allocated \$90 million of new funding over three years to the Networks of Centres of Excellence to create up to eight new networks. In 2000-2001, 596 companies, 143 provincial and federal government departments and agencies, 44 hospitals, 149 universities, and more than 269 other organizations were involved in the NCE program. In 2000-2001, the networks stimulated outside investments of over \$80 million, including more than \$48 million, by participating private-sector companies (Sulzenko 1998, 292-93). The impact of the NCE program is enhanced in Ontario where it built on the pre-existing base of the provincial Centres of Excellence program (discussed below).

Traditionally one of the most important direct subsidy programs used by the federal government to support research and development in Canadian industry was the Defence Industry Productivity Program. Introduced in 1959, and then modified in 1968, the program provided strong support for the Canadian aerospace and defence-related industries in Ontario and Quebec. Firms were able to obtain conditional grants for the eligible costs of R&D projects, to cover the costs of acquiring advanced production equipment for modernizing or upgrading manufacturing facilities, to cover the costs of establishing qualified Canadian suppliers of defence related products (source establishment assistance) and to carry out market feasibility studies (Botham and Giguère 1993, 82). DIPP was abolished in 1995, along with most other federal subsidy programs, as part of the expenditure restraint effort. In 1996, in response to the federal Science and Technology Strategy, it was replaced by the new Technology Partnerships Canada program, designed to support the efforts of private sector partners to commercialize high technology products and processes. Originally funded at \$150 million a year, it grew to \$250 million a year by 1998/99. Seriously oversubscribed, it was provided an additional \$50 million a year for the next three years in the subsequent budget. While nominally run from Ottawa, increasing responsibility for the administration of the program is being transferred to the regional offices of Industry Canada and grants made under the program are being evaluated from the broader perspective of their potential impact on the regional economy.

A key addition to the federal government's policy mix is the Canada Foundation for Innovation, introduced in the February 1997 budget, with an initial allocation of \$800 million over a period of five years. The CFI provides funds on a matching basis to the provinces or industry and the universities for the modernization of research facilities in the natural sciences, engineering and health sciences at universities, colleges, research hospitals and non-profit research institutes. Contributions by the CFI cover up to 40 per cent of the total cost of infrastructure projects, thereby leveraging a total of \$2 billion in new infrastructure funding. CFI funding includes expenditures for the acquisition of state-of-the-art equipment, establishing computer networks and communication linkages and creating significant research databases and information-processing capabilities (Sulzenko 1998, 294). The 1999 budget allocated an additional \$200 million to the CFI to help it meet the growing demand for research infrastructure in the areas of health, the environment, science and engineering. Ontario's Innovation Trust provides the matching provincial funding for this key federal initiative and the heavy uptake by provincial researchers necessitated a major new commitment of provincial funds in June 2002. The last budget before the 2000 general election introduced another new federal program with major implications for the regional innovation system. The federal government set aside \$900 million of federal funding over five years to create 2,000 new Canada Research Chairs at universities across the country, as well as a further \$900 million to the Canada Foundation for Innovation, raising the federal government's total commitment to the CFI to \$1.9 billion (Martin 2000).

Another key contribution the federal government makes to support innovation across the country is through its premier science and engineering organization, the National Research Council. The NRC has 3,000 staff located in ten centres across the country and accounts for 13 per cent of total spending on R&D by federal departments and agencies. Its primary objectives are: to undertake world class research, build partnerships with industry and other research organizations, and concentrate on areas of research that raise Canada's competitiveness. The large number of NRC laboratories in the province accounts for a disproportionate share of federally funded and performed R&D in Ontario. The role of the NRC was enhanced with a set of measures introduced in 2000 to support cluster-based research centres in Atlantic Canada. The 2001 Budget provided further funding to support similar initiatives in other parts of the country – including a National Institute for Nanotechnology in Alberta, the Advanced Aluminum Technology Centre in Quebec, a new research program at the Plant Biotechnology Institute in Saskatoon, fuel cell research in British Columbia and the Canadian Photonics Fabrication Facility in Ottawa, deemed critical to the continued growth of that region's photonics cluster (Canada, Department of Finance 2001, 115–25).

Complementary to its role in producing basic science and engineering research, the federal government's public infrastructure also supports the adoption and diffusion of technology. The principal federal program in this area is the Industrial Research Assistance Program (IRAP), run by the NRC. IRAP was established in 1962 to provide assistance to Canadian firms to help solve technological problems in a timely and cost effective manner. It maintains a national network of 260 Industrial Technology Advisors composed of staff from the NRC and some one hundred other organizations across the country, including universities, federal government organizations and provincial research organizations. The ITAs work with firms to identify possible sources to solve their technological problems, such as the NRC itself, other public research organizations, universities or private companies. IRAP also provides grants to client firms to acquire the necessary technology or hire staff to implement recommended solutions and administers the Technology Partnerships Canada program for small and medium-sized enterprises.

Faced with a similar set of challenges, provincial governments in Ontario since 1980 have moved away from more traditional forms of industrial subsidies towards greater emphasis on programs to support and encourage innovation, often at the sectoral or cluster level.¹⁰ The first phase occurred under the Conservative government with the formation of the Board of Industrial Leadership and Development (BILD) in January 1981. The board, a cabinet committee, was charged with responsibility for coordinating all government spending on industrial, resource, transportation and regional development, budgeted at \$2 billion in 1980-81. In addition, it was assigned a new series of economic initiatives that were to amount to \$1.1 billion by the 1983 budget, of which \$503 million was designated for science and technology projects. The new portion of these funds represented a notable shift in the focus of provincial industrial and technology policy.

Principal among the new policy initiatives were the creation of the Innovation Development for Employment Advancement (IDEA) Corporation and the establishment of five new technology transfer centres. BILD was to provide \$107 million to the IDEA Corporation to use as seed capital in setting up five technology funds that would invest in industries based on

¹⁰ The following developments are treated at greater length in (Wolfe 1999a; Wolfe 2002c; Wolfe, et al. 2001).

microelectronics, biological and medical sciences, information processing and transmission, chemical and processing technologies and manufacturing automation. In addition BILD committed \$100 million over five years to fund five industry oriented technology centres: Automotive Parts Technology; Resource Machinery; Farm Equipment and Food Processing; Advanced Manufacturing (two separate CAD/CAM and Robotics centres); and Microelectronics. The mission of the centres was to enhance the competitiveness of Ontario industry and support the diffusion of new technology by: aiding in the development of high technology production through advice, funding and prototype development; providing training programs in advanced technologies to industry; providing information, seminars and technology awareness activities; and demonstrating technology hardware and software applications. In part, the establishment of the centres responded to the concerns raised in the report of a provincial task force on microelectronics, which noted with concern the slow pace of adoption of new process technologies. Some of the remainder of the funds went to help establish a new biotechnology firm, Allelix Ltd.; to support the diffusion of Telidon technology, which had been developed by the federal Department of Communications; and to support the Ontario Research Foundation, the provincial research laboratories (Jenkin 1983, 73; Miller 1983, 18–19; Grossman 1984).

The election of a minority Liberal government in June 1985 accelerated the pursuit of more active technology and innovation policies. The Liberal Government established the Premier's Council in April 1986, a multipartite body of Cabinet Ministers, influential business leaders, a small representation of labour leaders, and people from educational institutions. Its major report, two years later, portrayed effective international competition as the key to a high wage economic strategy and higher standards of living,

In the future our prosperity will depend increasingly upon our ability to sustain a sufficiently large base of companies competing in world markets, not on the basis of lower labour or raw materials costs, but rather through technological innovation, skilled labour, adept marketing, and high productivity (Premier's Council 1988, 35–37).

In conjunction with the Council, the Liberal government created a ten year \$1 billion Technology Fund. In June 1987 the Technology Fund launched its main initiative to upgrade the provincial research establishment when it designated seven provincial Centres of Excellence to carry out long-term basic research in Ontario universities. Each Centre involved a network of scientists of international standing at several Ontario universities and was mandated to stimulate the production of advanced research, to train and develop world-class researchers, and to encourage the transfer and diffusion of technology to industry. This program represented a significant departure for the provincial government: although the provinces have exclusive jurisdiction over post-secondary education, they have traditionally relied on the federal government to provide research funding to the universities through its three granting councils. This program served as a model for the federal Networks of Centres of Excellence program described above. The mandate of the Centres was renewed twice, under both the NDP and Conservative governments, the number reduced from seven to four and the mandate revised. An explicit requirement of the Centres' current mandate is that they engage in research collaboratively with industry partners who help to shape their research priorities. The purpose of this objective is to enhance the linkages between university-based research and industry and increase the potential for the commercial uptake of university research.

The succession of the Liberals by the NDP in 1990 signaled a more ambitious initiative to create systems of social learning within leading sectors of the Ontario economy. In the early 1990s, the literature on the potential value of regional networking and cooperation in enhancing competitiveness provided a useful model to emulate. The core of the NDP's innovation policy, the Industrial Policy Framework, built on the analysis of the Premier's Council report, but supplemented it with insights drawn from the experience of some US states and innovative regional jurisdictions in Europe. The goal of the framework was to promote the transition of the Ontario economy towards those sectors and firms with the capacity to generate higher wage, higher value-added and environmentally sustainable jobs (Ontario 1992).

The Industrial Policy Framework viewed the institutional infrastructure of the sector as an important source of competitive advantage for firms in the sector. The Sector Partnership Fund (SPF) was a five-year initiative to provide assistance to approved sector projects that led to higher value-added activities. The SPF provided funds on a matching basis to pay for both a strategic planning exercise and a set of policy proposals and programs flowing from this analysis. The objective was to animate a social process of negotiation and mutual learning in individual sectors, with the goal of moving towards higher-value-added production and more innovative firms. The Fund required labour market partners in the sector – industry associations, labour organizations and other stakeholders – to consult together in identifying common challenges facing the sector and developing strategies to respond to them. By any criteria, the initial stage of sector consultation and strategy formation was a success. Between the summer of 1992 and the provincial election in June 1995, government ministries with sector responsibilities worked with a wide range of industry associations, trade unions and other stakeholders to develop sector strategies. Consultative efforts produced approved strategies in more than twenty sectors. Although the Conservative government elected in 1995 formally terminated the Sector Partnership Fund, it subsequently refocused a number of its innovation policies around sectors, particularly in the area of information technology and biotechnology.

The Conservative government elected in 1995 campaigned on a platform, labeled the Common Sense Revolution, which evinced a preference for the use of broad framework policies, such as a reduction in the tax and regulatory burden on firms and individuals to stimulate growth, in contrast to the more targeted spending policies of the previous governments, such as the Premier's Council Technology Fund and the Sector Partnership Fund. For the first two years of its mandate the issue of innovation policy seemed far from the concerns of the new government. However, in 1997 it re-emerged on the policy agenda. The budget introduced the \$500 million R&D Challenge Fund designed to promote business-university partnerships and research excellence. The fund provides support for leading edge research that benefits today's growing industries and helps create the industries of the future; financing investment in state-of-the-art equipment and facilities; and incentives for gifted researchers to work in Ontario, including endowed chairs. Funding is awarded on a competitive basis, according to the proposal's contribution to research excellence and economic growth. One criterion of economic benefit is the ability to attract private sector support (Eves 1997, 177–83).

The reorientation of the government's policy focus continued in 1998. The budget identified strategic skills as the critical nexus between the emergence and rapid spread of new technologies and the resulting opportunities for growth in the local economy. Two new measures were designed to deal with critical skill shortages. The first was the creation of the \$150 million Access to Opportunities Fund to generate 17,000 additional places at Ontario universities in the high

demand computer science and engineering programs in each of the next three years. This measure was adopted in response to intense lobbying from the province's dominant IT firms who were facing critical skill shortages as the telecom boom of the late 1990s gained momentum. In addition, the government provided \$10 million to support four innovative training programs at cooperative research institutes and community colleges in the areas of automotive parts design and manufacturing technology, new media skills, telecommunications and metal machining and engineering (Eves 1998, 145–50).

This growing acknowledgment by the Conservative government of the importance of the innovation system and its contribution to the development of a knowledge-based economy gained further prominence in a vision document released shortly before the 1999 provincial election. The report by the Ontario Jobs and Investment Board, *A Road Map to Prosperity*, responded to a request from the Premier to develop an economic vision and action plan, with a strategy to ensure jobs, investment and economic prosperity for the province in the first two decades of the next century. The recommendations of this report were followed up in the 1999 Ontario Budget with the establishment of the Superbuild Growth Fund designed to consolidate the government's entire infrastructure spending under one program and inject \$20 billion into rebuilding the province's infrastructure over the next five years, half of which was to come from other public and private sector partners. In February, 2000, the government announced one of its first investments by the Fund – \$1.4 billion in new capital projects for the province's colleges and universities, the largest such investment in 30 years. Subsequent announcements have committed a total of \$2.6 billion involving 74 new capital projects for expanding the physical infrastructure of the post-secondary educational system.

The success of the government's innovation-oriented initiatives began to create internal funding pressures in all of the major new programs in 2001-02, as the initial funding commitments were expended and the demand for new research funding, especially within the post-secondary educational system, continued. However, the provincial budget of June 2002 addressed many of these concerns as renewed funding was announced for each of the three centrepiece programs – the Ontario Research and Development Challenge Fund with \$250 million of new funding, the Ontario Innovation Trust with \$300 million of additional funds, and the four provincial Centres of Excellence, which were given a new mandate and had their funding extended by \$161 million. The government also used the occasion of the Bio2002 International Biotechnology Convention, held in Toronto in June 2002, to announce \$51 million in funding for various biotechnology initiatives, widely recognized as one of the most potentially critical areas for future growth in the province. The funding included provincial support for the innovative MaRS (Medical and Related Sciences) Discovery District to be developed adjacent to the University of Toronto's campus – situated amongst its dense network of teaching and research hospitals – to assist in incubating and commercializing new products generated by these research facilities (Research Money 2002a). The most recent budget introduced in April, 2003 further expanded the commitment of funds for research in the province by signaling the creation of the Cancer Research Institute of Ontario with a targeted budget of \$1 billion over ten years.

Part 3: Policy Frameworks for the New Paradigm

The emphasis on learning through networks of social relations among firms and institutions is clearly reflected in the preceding discussion of the nature and significance of innovation systems at the national and regional levels and clusters at the local level. All three levels of analysis reinforce the observation that successful competition in knowledge-intensive industries draws upon a complex set of relationships between groups of interrelated firms and supportive institutions, rather than archetypical autonomous firms. And all three provide a conceptual foundation for the answer to a key question facing policy-makers – that of how best to create the conditions to stimulate innovation and competitiveness. Where they differ, however, is in their emphasis. The concept of clusters stresses more a spontaneous interdependence of geographically proximate firms, whereas the concept of innovation systems suggests a more planned process with greater emphasis given to regionally-based cooperation among firms, as well as institutions responsible for creating and diffusing knowledge (Isaksen and Hauge, 2002). However, as suggested above, these three levels of analysis and the corresponding policy approaches are not mutually exclusive; rather they are best viewed in terms of the concept of ‘nested scales’ as all being necessary and relevant for an effective economic development strategy.

In both frameworks, governance mechanisms are central. Indeed, the capacity to foster durable and interactive linkages among a range of actors has not only become a policy goal in itself but also an important component of state power. The government’s ability to cooperate and collaborate with a wide range of stakeholders has become intrinsic to effective economic power in knowledge and innovation intensive economies (Cooke and Morgan 1998). Yet, recognizing the importance of cooperation is only part of the policy challenge. As with any other economic activity, successful collaboration and cooperation are underpinned by social institutions. Trust, social norms, and loyalty, all aspects of the more general notion of social capital, lie at the core of mutually beneficial and successful cooperation. Economic development policy that seeks to strengthen the density of these associational linkages must include elements directed at not only interfirm linkages but also the underlying culture of the regional or locality. The reasons for this, and several approaches that incorporate this objective are discussed below.

Trust and social capital

The dynamic of institutional relationships underlying more cooperative forms of governance requires a greater capacity for social capital and trust among a wide range of social and economic actors within the region, including erstwhile competitors. Social capital refers to various features of the social organization of a region, such as the presence of shared norms and values that facilitate coordination and cooperation among individuals, firms and sectors for their mutual advantage. The use of the term capital indicates that it involves an asset, while the term social connotes that the particular asset is attained through involvement with a community. The existence of social capital depends upon the ability of people to associate with each other and the extent to which their shared norms and values allow them to subordinate their individual interests to the larger interests of the community. It secures the conditions that enhance the benefits derived from more tangible investments in physical and human capital. Without its supportive functioning, high levels of these more tangible forms of investment may fail to produce the benefits that should potentially flow from them (Putnam 1993, 167–76; Maskell 2000). The networks that constitute social capital in this sense comprise a rich and dense social community

in which the business relationships of the local economy are embedded. Social capital tends to be accumulated as an unintended consequence of other activities that people are engaged in; its presence or absence is linked to the vitality of civil society in that region.

The concepts of social capital and trust help us appreciate why certain kinds of economic activity tend to cluster despite the opposing trend towards dispersal brought on by the spread of globalization. Peter Maskell suggests that it helps explain why some regions continue to be 'sticky' in attracting strong concentrations of firms in related activities. The process of globalization tends to transform what were previously localized inputs into *ubiquities* that can be readily accessed by more or less all firms at a variety of locations around the globe. Firms faced with this shift in their competitive environment search for alternative inputs on which to base their competitive advantage. Such inputs must have a high potential value and be difficult to imitate or replicate (Maskell 1999). Social capital represents one such input. It becomes progressively more valuable as the process of globalization continues; it is not equally available in all communities; it cannot be purchased or transferred; and it is difficult to imitate or replicate. Trust, as a component of social capital, helps overcome market failures or reduce the level of transaction costs for firms in densely related networks, by supporting stable and reciprocal exchange relationships among them. Partners involved in these relationships establish a willingness to exchange information on something more stable and enduring than a 'barter' basis. Both sides of the relationship can benefit from lower costs and improved quality in the knowledge thus attained. As these relations grow and develop, a larger component of the knowledge shared and transmitted becomes 'tacit', rather than explicit with a concomitant increase in the level of understanding gained through the exchange. Ultimately, the relationships can be extended to include other partners of the respective firms, further enhancing the extent and the value of the network (Maskell 2000; Lorenz 1993).

Researchers distinguish between two types of social capital involved here: one attributable to historical and cultural factors, whose roots are buried deep in the region's past and the other built up through the dense interactions of firms engaged in interrelated economic activities that have developed a high level of trust in their mutual dealings. Stephen Cohen and Gary Fields argue that European conceptions of 'trust' or 'social capital', which consists of trust in the historical and cultural sense, differs significantly from that found in successful North American regional economies, such as Silicon Valley. The social capital in Silicon Valley is grounded in collaborative partnerships that emerge out of the pursuit of economic and institutional objectives related to innovation and competitiveness. The trust and social capital that exist in Silicon Valley grows out of the collaborative networks of interacting firms, driven essentially by their mutual self-interest in maintaining their innovative edge. Trust exists in Silicon Valley, but it is a trust based on assumptions about the reliability and reputation of key actors – a performance-focused trust, grounded in the expectation of how prospective partners will perform in a network relationship (Cohen and Fields 1999; Leadbeater 2000, 139–48).

Building trust among economic actors in a local or regional economy is a difficult process that requires a constant dialogue between the relevant parties so that interests and perceptions can be better brought into alignment. Trust is one of those rare commodities that can neither be bought, nor imported; it can only be built up painstakingly through a prolonged process of interaction. A growing number of studies identify the existence of trust relations among a network of regional firms as critical for their competitive success, but the factors that contribute to its presence remain difficult to pinpoint. Authors, such as Charles Sabel (1992) and Michael Storper (1996)

underscore the critical role played by soft factors, such as talk, in building trust and the kind of long-term relationships that underpin the institutionalized learning economy. Storper suggests that talk and confidence are more likely to succeed when they occur in a setting that is geographically localized and that small, repeated low-cost experiments can help to generate interactive learning between parties in an environment which has previously been characterized by distrust or antipathy.

Policy delivery through multilevel governance

The new patterns of industrial organization that have emerged among growth industries in knowledge economy have necessitated not only new policy frameworks, but also new modes of governance to facilitate policy delivery. In the Keynesian era, success of the dominant firms was dependent on the extent to which they could produce generic products with economies of scale from a standardized and generally accessible knowledge base. These often large, stand-alone, firms competed primarily on price and managed risk associated with fluctuating consumer demand through formal production planning processes implemented through hierarchical command structures (Salais and Storper 1992). The governance issues that arose from such a mode of production could be dealt with primarily at the national level with the economic governance tools at hand: anti-trust regulation, labour relations policy, trade policy and macroeconomic policy.

In knowledge-intensive economies, however, the leading growth firms are often smaller, networked, less hierarchical, producing a variety of products that have been developed from a supply of specialized, and increasingly scientifically based, knowledge. Firms compete not just on price, but on their ability to learn, transforming new knowledge into products to meet new demand in yet-to-be-established markets (Storper and Salais, 1992, 179). The central governance issues have necessarily changed and are concerned primarily with the mobilization of knowledge resources: accessing university research, developing an educated workforce, fostering local learning networks and promoting collaboration. With such jurisdictional diversity, governance has become as much a national as a regional and local effort. These changes are reflected in a new emphasis in the economic development literature on governance as opposed to government. While the term government is associated with the hierarchical approach to industrial restructuring of the past, governance implies a more flexible multilateral process of negotiated economic development whereby national authorities are increasingly in partnerships with regional and local levels of government as well as private sector organizations in an effort to deliver policies.

Associative Governance

This new type of policy structure of has been captured by two related concepts in the literature, that of 'associative governance' and 'multilevel governance'. Though each term gives a slightly different emphasis to this emerging form of governance structure, their fundamental principles are similar. Associative governance, like multilevel governance, signifies the growing shift from *hierarchical* forms of organization in both public and private institutions to more *heterarchical* ones in which network relations are based on conditions of trust, reciprocity, reputation, openness to learning and an inclusive and empowering disposition. According to a number of authors (Amin 1996), this requires a shift from reliance upon public authorities associated with the state to regulate economic affairs to a greater degree of self-regulation by autonomous groups in the economy and society. This in turn involves the transfer of authority and responsibility of some

critical aspects of economic policy to a range of local organizations capable of providing the required services or programs (such as vocational training or technology transfer). It also necessarily involves a more decentralized, open and consultative form of governing. It is closely associated with the process of institutional learning and adaptation within the region (Cooke 1997).

A key challenge for the state operating in this mode is to establish the conditions under which key actors in the innovation systems – firms, associations and public agencies – can engage in a self-organized process of interactive learning. The ability to operate in this mode depends on two major institutional departures from the way in which the Weberian conception of the bureaucratic state traditionally functions. First, it implies the devolution of power in the state system from remote bureaucratic ministries at the national level to local and regional levels of government better positioned to build lasting and interactive relations with firms and business associations in their regions. In addition, it may involve the delegation of certain tasks like enterprise support services from formal government agencies to accredited business associations because the latter possess relevant assets, such as knowledge of, and credibility with, their members, which the state needs to enlist in order to ensure the effectiveness of its support policies. Devolving power to the lower levels of government creates the opportunity for more meaningful dialogue to take place at the regional level. This is important because dialogue or discussion is central to the process by which parties come to reinterpret themselves and their relationship to other relevant actors within the local economy (Morgan and Nauwelaers 1999, 12–13).

The appeal of the associative model of governance, especially at the level of the more dynamic regional economies, derives from the insights afforded by this analysis. The associative model substitutes for the exclusive role of the public bureaucracy a mix of public and private roles and it emphasizes the context of institutional structures and learning. It involves the devolution of greater degrees of autonomy and responsibility for the policy outcome onto those organizations that will both enjoy the fruits of the policy success or live with the consequences of its failure. According to Amin, the adoption of an associative model does not imply an abandonment of a central role for the state, but rather a rethinking of its role. In an associative model, the relevant level of the state has to become one of the institutions of the collective order, working in relationship with other organizations, rather than operating in its traditional command and control fashion. The state in this model continues to establish the basic rules governing the operation of the economy, but it places much greater emphasis on the devolution of responsibility to a wide range of associative partners through the mechanisms of ‘voice’ and consultation (Amin 1996, 19).

Multilevel governance

Multilevel governance is a term pioneered by Gary Marks (1992; 1993) to represent a new model of political architecture where political authority and policy making influences are dispersed across the different levels of the state as well as to non-state actors. In principle it is similar to the concept of associative governance although the latter refers primarily to relations between state and non-state actors at a particular level of the state system or at a particular spatial scale. Where multilevel governance differs is in its greater emphasis on cooperation among different levels of government, rather than on cooperation between the public and private actors. This emphasis stems from the concept having been developed in the context of European integration where the

creation of a third tier of policy making, the European Union, and the adoption of the principle of subsidiarity as a central tenet of the Single European Act of 1992, had a profound impact on the relative powers of both national and subnational or regional levels of the European state. Hooghe and Marks argue that the core of the idea of multilevel governance is that the national level no longer monopolizes policy making and instead engages in collective decision-making with other levels of government and relevant actors, and in so doing, cedes control of the policy making process. Decision-making competencies are therefore shared among all actors with no one level exercising monopoly over another. Accordingly, subnational levels are said to be interconnected to national, and at times, supranational arenas rather than nested within the national state (2001, 4).

In the North American context, where three tiers of government is the norm, the concept of multilevel governance helps us recognize the interdependent nature of their respective roles and jurisdictional responsibilities, as well as the role of informal actors not explicitly recognized in the constitutional division of powers, yet whose active involvement is of increasing importance to achieving successful policy outcomes. Regional and local actors are a necessary source of knowledge in local learning networks, assisting in the process of collective learning that is vital to the success of knowledge-intensive firms.

Joined-up governance

Equally relevant is a third concept that is closely associated with, and complementary to, the previous two. The conventional bureaucratic structure, especially in a Westminster type of legislative system operating on the principle of individual ministerial responsibility necessitates policy development and implementation within bureaucratic hierarchies where lines of accountability are clearly delineated. This has given rise to the dilemma of 'policy silos' where relevant components of economic development policy are often formulated and implemented within discrete bureaucracies across separate ministries, or even separate divisions within the same ministry. While this policy approach places a high premium on maintaining appropriate lines of accountability, it falls down on the ability to deliver policy in an integrated and coordinated fashion on the ground in specific regions or localities. This traditional hierarchical approach to policy delivery is increasingly viewed as out of touch with, or even inimical to, the more integrated geographic perspective afforded by the systems of innovation or cluster approaches described above.

A valuable alternative to the traditional hierarchical approach is a more horizontal policy process that local level involvement can help foster, leading to what Gaffikin and Morrissey call 'joined-up governance' (2000). By helping break down policy silos that persist in less interconnected governance systems, such joined-up, horizontal governance allows policy to be developed and administered in a more holistic – and ultimately – more successful manner. Key 'exogenous' community level issues like transportation, typically marginalized in economic development strategies despite their integral importance to successful policy outcomes, are included in a joined-up form of governance and thus become endogenous to the policy process. As society becomes more complex and policy issues become ever more interdependent, the need for such a horizontal approach is all the more pressing. Only through an approach provided by 'joined-up governance' is it possible to ensure that the appropriate policy actors and policy instruments, regardless of their particular bureaucratic home, are brought to bear in analyzing and responding to the economic development challenges facing particular regions or communities. Another

rationale for including the local level within a multilevel governance framework is to improve coordination among the policies and programs of the different levels of government. The improved communication that results from having all levels present ensures that duplication and program overlap can be minimized.

It should be noted that empowering the community by localizing policy design and delivery does not imply a 'hollowing out' of the national level whereby the national level experiences a diminished governing capacity at the expense of lower tiers (Jessop 1994). Rather multilevel governance involves allocating 'roles and responsibilities in relation to the comparative advantage of each government' (Bradford 2003) and indeed, at most is 'a letting go of competencies that are better administered elsewhere' (Cooke 2001). Municipalities, for example, are best suited for convening the actors necessary for effective partnerships, for undertaking land use and development planning for inclusive urban and metropolitan spaces, and for working with other local authorities. The provincial, federal and supranational levels on the other hand are best positioned either constitutionally or from their respective vantage point, for supplying the resources for critical infrastructure, ensuring a 'cooperation friendly' macroregulatory framework in which local and regional actors are embedded (Gertler 2002), and for transmitting best practices across the country.

To summarize, associational and multilevel governance are thus two dimensions of a framework for creating a form of governance that can respond effectively to the demands of the knowledge-based economy. They promote a collective process of interactive learning not just within the state but also among firms, associations, and public agencies that is essential to innovation in the modern knowledge-based economy. Thus for such learning to be effective, the institutions of the state must themselves undergo a process of adaptation. In the context of the forms of associative, multilevel and joined-up governance, such processes of institutional learning must extend across, and include, key actors in both the public and private sectors at all three levels of governance.

In his study on successful cities and communities, Neil Bradford identifies three learning dynamics that appear to be at work. The first is a *civic learning* process that results in a recognition among the local organizations, be they private or public sector, of the importance of equity, diversity and interdependence and the need to accommodate these realities in their collaborations. And, rather than merely accepting the need for a fair distribution of resources (equity), a diversity in social relationships or a dependence on others to coordinate one's objectives, communities with successful civic learning recognize these local realities as an asset. Equally important, though is the second dynamic of *administrative learning* whereby administrators learn new skills for building relationships, seeking consensus, assessing risk and measuring performance. Such skills help foster a government that is effectively engaged in its essential roles of ensuring balanced representation of social interests, addressing systemic differences in the capacity to participate, convening and organizing meetings, establishing protocols for monitoring progress and maintaining the focus and commitment of social partners. Finally the culmination of successful civic and administrative learning leads to the third dynamic, that of *policy learning*. Here, feedback from the various actors within the multilevel governance process refocuses the policy agenda with street level insights and experiences as well as new goals (2003).

Making multilevel governance work: the importance of institutional learning

The kind of interactive learning described above requires a degree of *reflexivity*, or the ability to self-monitor and learn from past successes and failures, in other words, to learn how to learn. This notion of institutional *reflexivity* poses important questions about the nature of public policy formation in modern democracies; for it is not only private institutions that must learn and adapt to the changing realities of a more innovative economy, but public ones as well. In the traditional Weberian conception of bureaucracy, the administrative apparatus is the repository of all relevant policy knowledge and expertise. The policy revolution of the postwar period, with its emphasis on the rational approach to policy formation, reinforced this traditional foundation. This approach downplayed questions of conflicting interests in the formation of policy and highlighted the potential contribution that expert analysis could make to solving complex problems.

Yet the more recent acceptance in the policy literature that rationality is bounded and that conflicting choices and values underlie our conception of the public interest leads to a more contingent approach. In this perspective, the role of policy analysis contributes to the discourse and bargaining within which public policy is formed. The organizational and institutional structures within which policy is formed are also critical. The design of appropriate policy depends to a large extent on the design of organizational structures capable of learning and adapting to what is learned. This concept is not entirely novel; it has begun to appear with increasing frequency in the literature on “policy making as social learning.” Yet, as Hall points out, the concept has been presented in only the sketchiest of terms and for the most part, it has been rooted in the literature that emphasizes a strong degree of state autonomy. To the extent that social learning describes the policy process, it applies to a process internal to the state (Hall 1993, 275–76). As such, it remains grounded within the traditional Weberian conception of the state and its bureaucracy.

The idea that institutional learning is relevant to policy-making must go beyond the stage of policy formation. Although policy is formulated at the highest levels of government, it is generally carried out by lower levels of government, frequently in interaction with private parties. The actual policy as it is implemented on the ground involves working out conflicts among winners and losers as it is implemented; the broadly defined policy may change in the process. What ends up being implemented often differs radically from what the policy makers originally had in mind (Majone and Wildavsky 1984). The effectiveness with which policies are implemented depends on the capacity of the institutional structures to adapt to this reality:

... if one views policy making as a continuing process, the organizational and institutional structures involved become critical. Public policies and programs, like private activities, are embedded in and carried out by organizations. And in a basic sense, it is the organizations that learn, and adapt. The design of a good policy is, to a considerable extent, the design of an organizational structure capable of learning and of adjusting behaviour in response to what is learned.
... just as many analyses of the workings of the market economy tend to abstract the private economy from public policies, programs and institutions, too many analyses of public policies and programs do not recognize adequately that their

effects will be determined, to a considerable degree, by private and not governmental actors (Nelson and Winter, 1982, p. 384).

In his associational model, Amin conceives of a reflexive state that includes four key principles. The first is a degree of decision-making pluralism, which involves delegating decision-making authority to the levels and bodies at which policy effectiveness can best be achieved. The second involves the notion that the state provides strategic leadership and capacity to coordinate. This is not a role that follows from the politics of command and control. Effective leadership requires the combining of authority with a capacity for consensus building in the appropriate arenas. The third point involves the adoption of a process of dialogic rationality. The relevance of dialogic democracy involves a lasting consensus that results from interactive reasoning. The fourth point involves the commitment in the process of democratic practices to transparent and open government.

Bringing in the community: governance structures in the new paradigm

The critical issue involves how best to deploy the conceptual framework outlined above to influence the trajectory of growth for a regional or local economy and through what specific mechanisms or policy instruments. Communities and regions, like companies, need to innovate and adapt to remain competitive. As a result, successful regions must be able to identify and cultivate their assets, engage in collaborative processes to plan and implement change, and encourage a regional mindset that fosters growth. These circumstances put new pressures on processes of regional planning.

It is evident from both the relevant literature and the available case studies that not every community succeeds in rising to the challenges outlined above. Often communities suffer from a deficit of social capital, an inability to generate sufficient trust or cooperation among key players to generate the supportive institutional arrangements required to promote growth at the local and community level. This may result in a 'governance' failure, as opposed to a state or market failure, which arises from the inability to bring key players together to develop new institutions and the required supports. It may also result from a lack of policy coordination, especially from the three levels of government, who frequently are not aware of the actions and initiatives being pursued by the others at the local and community level.

Foresight and strategic planning at the local and regional level

One set of techniques that has been developed and applied at the local and regional level in both Europe and North America involves a process of strategic planning or regional foresight exercises. North American communities have tended to place more emphasis on strategic planning processes and the Europeans have developed a variety of mechanisms to promote regional foresight and regional innovation strategies, but the respective processes share a lot of critical elements in common and will be discussed in an integrated fashion. Both processes stress participative community-based methods and strategic futures techniques. In the European context, foresight is defined as "a systematic, participatory, future intelligence gathering and medium-to-long term vision building process aimed at present-day decisions and mobilizing joint actions" (Gavigan 2001, 3). According to the *FOREN Practical Guide to Regional Foresight*, foresight exercises involve five essential elements:

- • structured anticipation and projections of long-term social, economic and technological developments and needs;
- • interactive and participative methods of exploratory debate, analysis and study, involving a wide variety of stakeholders, are also characteristic of Foresight (as opposed to many traditional futures studies that tend to be the preserve of experts);
- • these interactive approaches involve forging new social networks. Emphasis on the networking role varies across Foresight programmes. It is often taken to be equally, if not more, important than the more formal products such as reports and lists of action points;
- • the formal products of Foresight go beyond the presentation of scenarios (however stimulating these may be), and beyond the preparation of plans. What is crucial is the elaboration of a guiding strategic vision, to which there can be a shared sense of commitment (achieved, in part, through the networking processes);
- • this shared vision is not a utopia. There has to be explicit recognition and explication of the implications for present day decisions and actions (Gavigan 2001: 4).
-

Regional foresight involves the implementation of this process at a smaller spatial scale where the factor of proximity takes on enhanced significance. One of the most commonly cited rationales for foresight is that of correcting 'system failures'. The foresight process itself is said to enhance communication between actors within a system, providing a means of coordination and generating commitment to action. Critical to the success of regional foresight exercises is the ability to involve key agents of change and sources of knowledge that can formulate a strategic vision for the region and generate the intelligence needed to chart a new direction to the future. The engagement of key actors and the recruitment of collaborative and entrepreneurial leaders at the local and regional level is essential for a positive outcome to these exercises.

However, it is also important to remember that individual agents at the local scale operate within the framework of existing national and regional policies and institutions. Although economic development occurs primarily at the local or regional level, the process is embedded within a complex set of economic, social and institutional relationships constituting innovation systems at the regional (RIS), national (NIS) and even supranational level. It is impossible to appreciate fully the process of economic development in isolation from the interaction that necessarily occurs between these multiple levels of governance. Hence, one key challenge for those designing regional foresight or strategic planning exercises is to appreciate how the scope for local action by individuals and organizations is shaped or constrained by institutional influences at higher levels of governance.

Strategic planning as a knowledge sharing exercise

Key contributors to the success of regional foresight exercises are the role of knowledge flows and system-wide learning. Knowledge of other actors' strategies and positioning vis-à-vis a given issue (e.g. through foresight or strategic planning) can reduce uncertainties, thereby enhancing a system's innovative capacity. The potential for system-wide learning, which is also said to enhance a system's capacity for innovating, can be facilitated through the participation of key actors in the foresight process which contributes simultaneously to their understanding of others' positions, as well as the overall strengths and weaknesses of the regional or local

innovation system. The degree of mutual understanding and trust is facilitated by the *processes* that strengthen interactions between actors so that they become more permanent – such as technology foresight.

This new approach to regional economic development is characterized by both ‘how’ it is done, and ‘what’ it focuses on. Experience has shown that successful strategic planning methods:

- • Are demand and opportunity driven;
- • Promote innovative ideas in all aspects of regional economic activity,
- • Facilitate relationship-building, and
- • Are ongoing, iterative and non-linear.

Successful strategic planning exercises are concerned with an area’s unique local characteristics that support the development of regional industry clusters. These include knowledge economy assets (such as workforce skills, knowledge and research development, creativity, advanced telecommunications infrastructure, quality of place, and financial capital), collaborative institutions and organizations (such as regional development organizations, professional networks, research consortia, and entrepreneurial support networks), and the regional mindset (values and attitudes).¹¹

The role of community leadership

Recent experience in North America suggests that it is possible for local communities to formulate strategies to alter their economic trajectory and improve their prospects for economic development. What is required is the presence of an ‘economic community’ – places with strong, responsive relationships between the economy and community that afford both firms and the community a sustained advantage. These relationships are mediated by key people and organizations who bring the respective economic, social and civic interests in the community together to collaborate on strategies for the community. According to Doug Henton and his collaborators, “the distinguishing feature of economic communities is not just that they have clusters but that they have mechanisms to engage their clusters and understand what they need from the community” (1997, 7). The scope for individual agents and local politics to influence local and regional outcomes would seem to be considerable, since these relationships are mediated by key people and organizations that play a leadership role in bringing the economic, social and civic interests in the community together to collaborate.

One virtue of an agent-centered approach to the process of cluster development and regional innovation is the emphasis placed on involving key actors at the local level in thinking about how to design effective innovation strategies. However, the source of that leadership may vary. In some regions, it comes from political institutions or industry associations. In others, it originates with an inspirational figure in a university setting or anchor firm that attracts or spins off like-

¹¹ In addition to the *FOREN Practical Guide to Regional Foresight* prepared for the European Union, the Economic Development Administration of the US Department of Commerce has commissioned several manuals for local economic development agencies, cf (Information Design Associates and ICF Kaiser International 1997; Montana, Reamer, Henton, et al. 2001). Another helpful manual was prepared for the National Governors’ Association, cf (National Governors Association 2002).

minded individuals in other firms. In the end, their role is to mobilize those in the community with an interest in altering its development trajectory.

Collaborative organizations and institutions often embody values and attitudes that are intrinsic to the region. This element of the regional culture is an important, but overlooked, component in the design of regional development strategies. The essential criterion for success is finding the appropriate mechanisms to engage key members of the community in a sustained effort to advance its opportunities. The recruitment of a committed, creative and collaborative leadership is an essential element for the success of a strategic planning process in regional foresight and regional economic development. These kinds of collaborative leaders invariably share certain characteristics:

- • they can see the opportunities opened by the emergence of the knowledge-based economy;
- • they exhibit an entrepreneurial personality, in both a business and a 'civic' sense;
- • they are willing to cross functional, political and geographic boundaries in pursuit of their strategic goals;
- • they demand a sharing of both responsibility and results, and consequently are trusted as credible intermediaries;
- • and they are committed to, and comfortable working in teams (Montana, et al. 2001, 31–35).

The leadership for strategic planning exercises needs to create a broad buy-in from all the relevant elements of a regional and local community. The first challenge that the leadership of such an exercise must meet is to recruit an effective team to manage the strategic planning process in foresight and economic development. Having done so, it is crucial to elaborate a sense of how the foresight exercise can contribute to the development of a vision for the region's economic future.

Based on their experience with launching community-based economic development initiatives Doug Henton and his colleagues argue that social capital is a critical ingredient in the success of the most dynamic clusters and regional economies. Social capital *can* be created and the basis for doing so is the establishment of collaborative networks between various elements of the business and civic communities.

The presence of *collaborative institutions and organizations*, such as cluster organizations, professional networks, research-industry consortia and entrepreneurial support networks, greatly facilitates this environment. These alliances, networks and other relationship-building mechanisms create connections and linkages vital to economic development in a technology-driven world. . . . many regions fortunate enough to have university research assets underuse these knowledge economy resources, precisely because relationships have not been established to connect the university and local industry. . . . Relationships matter (Montana, et al. 2001, 10).

Tools for Foresight and Strategic Planning

Most foresight exercises deploy the use of 'expertise' in some form or another, the premise being that experts have a better insight into future technological (and social) developments than non-experts. A variety of different techniques have been developed to access this specialized expertise, including the use of panels, questionnaires, interviews, and Delphi. Other tools that can be deployed to mobilize local and external expertise in support of the foresight exercise involve benchmarking exercises and the use of collective decision tools to identify key elements of the vision and to facilitate the formulation of a common perspective on the key issues involved.

Benchmarking exercises have gained dramatically in popularity as a strategic planning tool at the state level in the US. A number of states, such as Oregon and Massachusetts have developed high visible and successful sets of indices that are used to benchmark their respective states against the other forty-nine states in US. The benchmarking exercises are intended to serve as guideposts at the state level for desired actions to improve the competitive position and economic prospects for the jurisdiction. A comparable exercise has been conducted at the local and community level by the Progressive Policy Institute in the US which has now produced several versions of *The State New Economy Index: Benchmarking Economic Transformation in the States* (Atkinson, Court, and Ward 1999), and *The Metropolitan New Economy Index: Benchmarking Economic Transformation in the Nation's Metropolitan Areas* (Atkinson and Gottlieb 2001). A similar but somewhat different exercise was involved in the effort by the Milken Institute to develop the index of high tech metropolitan areas found in its publication *America's High-Tech Economy: Growth Development and Risks for Metropolitan Areas* (DeVol 1999). Another creative method deployed in corporate foresight exercises, in the European context and the federal government of Canada involves the development of scenarios by key groups of actors in the overall exercise. The process of scenario planning was used quite effectively in the federal government in the context of the Roundtable on Governing in an Information Society between 1990 and 1997 (Rosell 1995; 1999).

A number of the tasks associated with conducting foresight exercises include the following:

- Raising awareness of the exercise throughout its life time;
- Scoping the exercise to see what is possible and feasible;
- Locating participants (experts and stakeholders);
- Gathering background information;
- Identifying drivers and perspectives;
- Open consultation;
- Presenting future developments;
- Managing diversity of opinions and/or integrating views;
- Defining key actions and priorities; and
- Dissemination of findings.

Stages of the Strategic Planning Process

The key leaders direct the strategic planning process through a series of stages that are critical to the successful outcome of the exercise. The initial phase involves a process of visualization in

which the participants develop a shared perspective on the desired future for their region or community. For the entire exercise to remain credible in the eyes of its participants the vision must be perceived as achievable – something that is grounded in the current reality of the regional or local economy and that could grow and develop logically out of its economic base or knowledge assets. This initial stage must be grounded in a critical self-assessment of the region or community's current status.

If the vision requires a serious departure from the current trajectory of development, ie. a break with its established path, then it must provide a credible account of how the alteration of this trajectory can be achieved. The next stage involves building a broad and inclusive team of community participants to undertake the visioning exercise. A common pitfall encountered in this process is the tendency for the economic development department of the local municipality or community to hand the exercise off to a group of consultants who then produce a conventional report that more often than not ends up sitting on a shelf. This pattern was exhibited in some recent exercises in large Canadian municipalities. To avoid this pitfall, the strategic planning exercise must develop the mechanisms for engaging a broad cross-section of community participants and ensuring that the participants remain committed to the process through its conclusion (Montana et al. 2001).

The following stage involves a process of framing the opportunities and challenges facing the community. This stage involves the process of developing a shared understanding of the current economic status and future prospects for the region. It must include a realistic assessment of the current challenges facing the community or region, the assets and capabilities that the community has to respond to these challenges, as well as potential opportunities that lie open to it. The framing exercise must also specify some key issues in the region's current situation that require attention or action. The more effectively the framing exercise is able to present a realistic picture of the region that is credible to participants in the process, the more likely it is to establish the basis for creating a buy-in for its eventual recommendations or action plan.

The framing exercise leads directly to the next step, the formulation of a series of concrete actions or initiatives that flow directly from the framing exercise. A successful illustration of this part of the process is the series of initiatives developed as part of The Ottawa Partnership's study of the region's growth potential in 2000. The exercise generated a series of thirty-three cluster-specific goals intended to promote the growth of the seven key clusters that were identified as the growth generators for the regional economy (discussed in more detail below). An effective action plan should also include a roadmap for how to implement the specified initiatives. The process of developing the initiatives and the accompanying roadmap is an important exercise for developing the shared sense of how it can all be achieved. To create this buy-in for the roadmap at the community level, the initiatives must respond to real needs identified by the community participants, especially members of the local business community.

Finally, the entire process must be recognized as an iterative one. No plan or roadmap is carved in stone. Economic conditions change and the challenges and opportunities facing a community are a constantly evolving target. To remain current and realistic, both the elements of the framing exercise and the initiatives that comprise the action plan and roadmap must be revisited on a periodic basis. The process of revisiting the exercise is also an effective device for renewing community participation in the planning process. The process of strategic planning outlined above bears a strong affinity to the regional innovation strategy (RS) exercises, as well as some of

the foresight exercises, undertaken in Europe during the past decade (described in greater detail in the next section). The RS exercises point the way towards an inclusive process involving all three levels of governance in the European Union in a coordinated effort, while working outside the bounds of a traditional state structure. The program is also predicated on the notion that strategic planning and foresight exercises can be developed using a bottom-up approach within a framework of multi-level governance (Morgan and Henderson 2002).

Economic Development strategies in the new paradigm

This paradigm shift also has dramatic implications for economic development strategies at the local and community level. The economic development literature refers to three waves of business attraction and economic development strategies. The oldest and most traditional approach, which corresponds historically to the Keynesian era from the 1950s to the 1970s, focused on strategies to attract individual firms to a region or locality, frequently by emphasizing the economic value of cheap factor inputs and by affording the target firms direct subsidies or tax reductions of an increasingly generous nature. The practice originated in the southern US states that used offers of low wage, non-union labour, inexpensive land prices and reduced taxes to attract plants from the industrial North. The practice was especially effective during the 1950s and 1960s in expanding the employment base of these states and raising employment and wage levels.

Business attraction policies became more competitive in the later part of the period as northern states, caught in the triple bind of competition from southern and other low wage jurisdictions, declining productivity levels and increased international competition responded with a host of similar policies of their own – including expensive tax abatements, job tax credits, training programs, low interest loans and other government subsidies to lower the cost of business. By the late 1970s virtually all US states had established industrial sales forces in their economic development agencies to attract industrial plants and back office operations into their jurisdiction (Ross and Friedman 1990, 3). While this approach was complemented by the introduction of second wave strategies in the 1980s, states continued to make extensive use of first wave incentives. States continued to reduce taxes, alter their tax codes, establish enterprise zones, and offer concessions for goods in transit, new equipment, job creation and R&D. However, comprehensive reviews of the effectiveness of these incentives in firm location decisions concluded that they were at best a secondary factor. Business incentives were judged to be more effective when all other variables were considered equal among competing sites within a region or substate area (Burnier 1991, 172).

This approach reached its apogee with the subsidies offered to German automotive firms by the states of South Carolina and Alabama to attract their major plant investments in the early 1990s. One of the most expensive such investments on record is the \$300 million expended by the state of Alabama in 1993 to attract the new M series sport utility vehicle to locate in the state. While other states including South Carolina finally dropped out of the bidding due to its prohibitive cost, Alabama was prepared to spend nearly \$200,000 per job to land the plant. According to the *New York Times*, this amounted to 18 times what Tennessee paid for a Nissan plant in 1980, more than 7 times what Tennessee paid for the GM Saturn plant in 1985, 4 times what Kentucky paid for a Toyota plant in 1985 and 3 times what South Carolina paid for the BMW plant in 1992. The state reasoned that the exorbitant cost could be justified because the additional investments attracted by the plant would more than offset the lost revenue in terms of jobs created and new

tax revenues generated. However, three years later, 35 per cent of the vehicle's contents were imported from Germany and only 10 of 71 primary suppliers to Mercedes were located in the state (Myerson 1996). Despite the high costs of this strategy, southern US states, such as Alabama and Mississippi have continued to write large cheques to major auto assemblers, attracting new investments from Honda, Mercedes, Nissan and others (Keenan 2003, B4).

Ontario, for its part, avoided the worst excesses of this approach by banning municipal bonusing in the 1960s, thus making it impossible for municipalities to engage in the kind of competitive bidding for firms that proved so destructive in the US. However by the early 1970s, and especially following the recession of 1973-74, it became virtually impossible for the province not to respond with a policy mix of its own. One of the first measures taken was the establishment of the Development Corporations of Ontario (on a regional basis) in 1973 with a mandate to offer a comprehensive program of assistance to Ontario firms, including: interest-free performance loans for firms locating in designated areas, term loans with flexible repayment options for smaller firms; venture-capital loans to Canadian firms seeking to adopt new technology; export support loans to cover warehousing costs; and industrial mortgage and lease back arrangements to help firms set up new manufacturing facilities. The Development Corporations were also assigned the role of establishing new industrial parks and in developing the Sheridan Park Research community that had been established in 1963. Sheridan Park provides facilities for private companies engaged in industrial research work and is anchored by the presence of the Ontario Research Foundation, the publicly funded research institution. This represented one of the first efforts by the provincial government to stimulate a more R&D-intensive manufacturing sector (Rea 1985, 221; Davenport, et al. 1982, 13-14). The Development Corporations continued to act as the primary vehicle through which all forms of provincial industrial assistance were flowed to private companies down to their termination by the Conservative government in 1995.

In the late 1970s and early 1980s, the provincial government came under further pressure to retain the existing manufacturing base through financial assistance to firms facing the prospect of industrial restructuring, especially in the automotive industry. The North American industry experienced a massive process of restructuring in the late 1970s, involving substantial capital outlays. Faced with intense competition from Japanese manufacturers and the possibility of global relocation, North American manufacturers looked to the federal and provincial governments to provide financial assistance.¹² In the spring of 1979, the province established the Employment Development Fund with an annual allocation of \$200 million to promote investment and industrial development on a long-term basis. A substantial part of the funds went to the auto industry to support new investment and create jobs, principally a grant to Ford of \$68 million in conjunction with the federal government to locate an engine plant in Windsor (Van Ameringen 1987, 285) and support in the order of \$100 million to Ontario pulp and paper companies to install pollution control equipment and upgrade capital to improve productivity (Jenkin 1983, 72). This initiative was followed in May 1980 by the joint provision of \$200 million in loan guarantees and \$35 million in grants in 1980 with the federal government to support the restructuring of Chrysler (Trebilcock, et al. 1985, 3-30).

This issue continued to be of relevance for Ontario throughout the next two decades. In the early 1980s, the province established what became the Strategic Investment (later the Domestic Industry Support) Branch in the Ministry of Industry, Trade and Technology with a highly

¹² For a good overview of the experience of restructuring in the Canadian auto industry, cf (Holmes 1987).

talented and knowledgeable group of financial experts. There was virtually no major investment in the automotive industry in Ontario from that point through to 1995 that did not occur without the participation of this office in some form. Among the new greenfield investments secured in this period with major government involvement were the Chrysler plant in Bramalea (repayable loan), the original Honda plant in Alliston (infrastructure grant), the Toyota plant in Cambridge (repayable loan, training grant and infrastructure grant), the Cami plant in Ingersoll (forgivable loan), and the new product mandate for the Ford Windstar plant in Oakville (training and infrastructure grant). The amounts expended in each of these cases were a fraction of the subsidies paid to BMW and Mercedes in the southern states and the province grew concerned at that time about its continuing ability to compete for these major new auto investments.

The pressure on the province to provide support to individual firms intensified considerably in the early 1990s under the combined economic pressure of the post-1990 recession and the political pressure of a government strongly committed to protecting jobs. In 1990, the Ontario Development Corporation introduced a Manufacturing Recovery Program to provide special financial assistance to firms affected by the post-FTA/NAFTA restructuring and the province participated actively in three high profile bailouts of individual firms, Spruce Falls Pulp and Paper, Algoma Steel, and de Havilland Aircraft. In each case most of the negotiations for the restructuring were handled by the Director of the Domestic Industry Support Branch, frequently with the direct involvement of the Premier and the Deputy Minister of Industry, Trade and Technology (Rae 1996, 140–54). In the same period, the Ministry also appointed a Special Adviser on Economic Adjustment for the automotive sector to pursue new greenfield investment from major assemblers not already established in the province. In part, this represented a provincial response to the frenzied bidding that had occurred for the BMW plant in South Carolina and the Mercedes plant in Alabama. The Special Adviser, in cooperation with the former Deputy Minister of Industry, Trade and Technology, expended considerable effort in trying to attract a proposed new Audi plant to Ontario, but their efforts failed when Audi dropped the plans for a major new investment in North America. The Conservative government elected in 1995 terminated virtually all these programs and offices; a decision that has been criticized by some experts for the ensuing loss of institutional memory and administrative capacity.

The competitive pressures faced by the automotive sector and the need for a new round of investment in the upgrading of plants and equipment in the current decade has led to continued pressure on the senior levels of government to subsidize these investments. Daimler Chrysler's cancellation of plans to upgrade a van plant in Windsor in 2001 and their decision to build a new cargo van plant in Georgia the following year with a package of \$200 million in incentives intensified pressure on the two senior levels of government in Canada to respond with business attraction packages of their own. The Ontario Government responded to the challenge with the announcement of an auto sector strategy in February, 2003. It committed to an investment of \$625 million over the next five years in expanding and enhancing existing programs, such as the Research and Development Challenge Fund, the Strategic Skills Investment Program and funds for infrastructure to make them more accessible for investments in the auto sector. While the federal government has not specified the form that its investment would take it has also committed to providing assistance to Ford and Chrysler to attract new investments or new product mandates to the province. The recent collapse of negotiations with Daimler Chrysler for a major new automotive investment in Windsor has led to considerable recriminations among key players, especially the Canadian Auto Workers and the two levels of government. Chrysler had

requested a total package of \$350 million in financial incentives to proceed with the plant and claimed 'progress' had been made in the negotiations. The company cited market conditions, not a lack of government aid as the primary reason for the cancellation of the investment (Van Alphen 2003). It is clear that given the overall size and strategic significance of the automotive sector, both the provincial and federal governments are prepared to continue to make strategic investments to renew the life of existing assembly plants and attract new ones. It is evident that Ontario cannot compete with southern US states in terms of the size of the total package it offers, the latest round of negotiations leaves open the question of whether both levels of government have committed sufficient resources – both financial and administrative – to stay in the game.

The second phase of economic development strategies emerged in North America in the early 1990s when a growing number of states and provinces began to focus more of their development efforts on building the educational and technological infrastructure that would provide the knowledge base to build their indigenous firms and attract new investments on the basis of their technological capabilities. In the US, state governors of both political parties began to focus their energies on policies to help adapt their local economies to the conditions of the new competition, including efforts to fill gaps in the capital markets, modernize small and medium-sized enterprises, accelerate the development and transfer of technology from universities to industry, enhance workers' skills and provide entrepreneurs with a higher level of management information. Whether these efforts were termed industrial policy or not, they shared in common the recognition that the conventional dichotomies, such as picking winners or losers, missed the point. The real question, as David Osborne expressed it, was how state governments could

reshape . . . the market so as to ensure that American winners emerge in global competition. Rather than targeting specific industries or products, most states are targeting *processes* technological innovation, capital formation, new business formation, the commercialization of research, and the adoption of new manufacturing technologies. . . . They are not trying to *plan* economic activity, but to quicken the pace of innovation, to sharpen our ability to bring new ideas to market, to increase the technological sophistication with which we manufacture (Osborne 1990, 10–11).

This second wave resulted in the establishment of over 100 public investment funds and more than 25 public venture capital funds and launched over 200 programs to stimulate technological innovation (Ross, et al. 1990, 4–5; Osborne 1990). Over the course of the 1980s, states such as North Carolina, Ohio, Pennsylvania and New York, each launched their own science and technology agencies. New York expanded the role of its Science and Technology Foundation, while Pennsylvania created its Ben Franklin Partnership in 1982. The New York foundation sponsored a competition among universities that led to the creation of 10 Centres for Advanced Technology. The centres have been responsible for the awarding of a significant number of patents and the issuing of technology licenses. In the case of Pennsylvania, the Ben Franklin Partnership led to the establishment of university-related advanced technology centres under the Challenge Grant Program for Technological Innovation. Each Advanced Technology Centre was built around a partnership of the universities, private industry and economic development groups (Lambright and Rahm 1991, 50–54; Jones 1991, 63).

In the late 1980s, a growing number of state governments began to perceive the limits to the second wave approach they were adopting. Both first and second wave approaches relied on the same public sector organizational dynamics to meet perceived public policy needs. As the focus changed from chasing smoke stacks to building public infrastructure and filling market gaps, they relied on the same fundamental approach by creating a plethora of new programs administered by discrete branches of individual line departments – often with little coordination or integration across programs and with minimal involvement of by the federal or local levels of government. They relied upon the organization of a group of public servants to act as the providers of a good or service. Businesses continued to seek advice, guidance or subsidies from a public office (Mattoon 1992, 12). Despite the recent fascination with the ‘new public management’ and its emphasis on the delivery of ‘business services’ and the role of citizens as ‘customers’, the nature of the bureaucratic relationship remains fundamentally the same as in the old industrial and bureaucratic paradigm. As such, the second wave business attraction policies and programs described above, as well as most of the new wave of innovation policies introduced in the 1980s and 1990s are subject to the same shortcomings as more traditional industrial policies and business attraction strategies. They fail to deal adequately with the issues of associative, multilevel and joined-up governance discussed above. Furthermore, they involved little capacity for social or policy learning in the sense described above by Neil Bradford.

In response to these perceived weaknesses, a growing number of officials at the state and local level turned to a new form of organizational design for the formation and delivery of business attraction and economic development strategies. In many respects, the emerging third wave of experimentation launched in the 1990s builds upon the principles of associative governance discussed above. A number of key principles are emerging to guide this new wave of experimentalism. Government resources are committed in response to a real demand identified by the potential beneficiaries of the program. Examples of this approach include manufacturing network initiatives in several US states where groups of private manufacturers have the primary responsibility for defining their sector-specific needs and committing their own resources before the state agrees to participate. In some respects, this approach shares features in common with the sector strategy initiative in Ontario between 1992 and 1995 (described above). Another principle embodied in this approach is that it leverages resources. It incorporates the recognition that the public sector, particularly at one level of government lacks the resources to respond to the full range of policy needs. The commitment of public funds is used to attract the participation of other actors in the private and not-for-profit sector or other levels of the public sector. This principle has been increasingly reflected in the design and delivery of a number of the more recent federal and provincial innovation policy initiatives, particularly the Research and Development Challenge Fund and the Canada Foundation for Innovation. Thirdly, the third wave approach abandons the presumption of the public sector agency as the monopoly source of knowledge and expertise and the sole supplier of critical inputs to the economic development process. It encourages the participation of other sources of knowledge and suppliers of key inputs. Finally, this approach builds in an element of feedback into the development process that incorporates many of the principles of reflexivity and social learning discussed above (Ross, et al. 1990, 7–9).

Changing conceptions of the determinants of investment

This growing interest in the third wave of approaches to economic development strategy was closely paralleled by a shift in understanding of the factors that ultimately determine inward

investment. In the first wave approach of the early postwar period the determinants of investment and business attraction strategies were largely considered in terms of the static factors of price for the key inputs to production – capital, labour, land costs and public taxes. In the second wave, the understanding of the determinants of location decisions affecting attractiveness of particular jurisdictions shifted away from the static factors of low input costs to the dynamic competitiveness factors that influence long-term innovative capacity – hence the emphasis on upgrading the knowledge infrastructure, improving the skill base of the workforce and the absorptive capacity of small and medium-sized enterprises with respect to technology adoption and diffusion. The emerging third wave is marked by a gradual extension and deepening of this understanding associated with the perceived implications of the shift to a more knowledge-based economy. Central to this approach is the view that the primary determinants of investment and location decisions are the quality of the physical, social and knowledge infrastructure of a region or locality.

A number of recent studies by scholars, such as Richard Florida, or organizations, such as the Milken Institute, emphasize the factors that attract talented and creative people to live in particular communities. In several studies undertaken for the Milken Institute, Ross DeVol and Joel Kotkin analyzed the way in which the emerging geography of the information-intensive and knowledge-based economy is altering the attractiveness of major urban centres in the US as sites for investment and business location. In the knowledge-based economy wealth will accumulate in those urban centres where intelligence in the form of creative, knowledge-based workers, cluster. Such concentrations are less influenced by the traditional determinants of business location, such as strategic transportation networks, availability of raw materials or density of urban population, than by the attractiveness of the location for these kinds of workers.

These individuals – investors, engineers, systems analysts, scientists and creative people – are as one analyst describes them ‘very sophisticated consumers of place’. To them, the world is essentially a smorgasbord of locales that compete for their affections and attention (Kotkin and DeVol 2001, 7).

The presence of these kinds of workers is one of the most important factors influencing the growth and development of clusters as well. Once a critical mass of knowledge workers begins to develop in a particular locale, it can become self-perpetuating. The flow of knowledge and information between firms and workers in these firms can be a critical factor in determining the dynamism of a cluster. One of the strongest competitive advantages for a particular urban centre can be its ability to access information from global sources and its efficiency in circulating that information among local knowledge workers (Wolfe and Gertler 2003, 21–23).

Richard Florida agrees that the critical determinant of whether a particular locale has an attractive climate for location and investment decisions is no longer just the quality of its *business climate*, but rather the state of its *people climate*. In the knowledge-based economy the most important determinant of firm location is the myriad of individual decisions by members of the ‘creative class’ about what they view as the most attractive locations,

The Creative Centers tend to be the economic winners of our age. Not only do they have high concentrations of Creative Class people, they have high concentrations of creative economic outcomes, in the form of innovations and high-tech industry growth. . . . The Creative Centres are not thriving for such

traditional economic reasons as access to natural resources or transportation routes. Nor are they thriving because their local governments have given away the store through tax breaks and other incentives to lure business. They are succeeding largely because creative people want to live there. The companies then follow the people . . . What [creative people] look for in communities are abundant high-quality amenities and experiences, an openness to diversity of all kinds, and above all else the opportunity to validate their identities as creative people (Florida 2002, 218).

The presence of multiple firms in a cluster reinforces its appeal as a location for members of the creative class. Rarely will they move to a new location on the basis of an initial job offer alone, but they will move in the expectation of enjoying a succession of employment opportunities. Florida argues that ultimately these location decisions are based on what he terms the *quality of place*, a combination of three factors:

- what's there, involving a combination of the built and natural environment;
- who's there, involving the diversity of the population that comprises the community;
- and what's going, involving the vibrancy of the cultural scene (Florida 2002, 232).
-

In light of this analysis, the key challenge for urban planners and those involved in formulating economic development strategies for the knowledge-based economy is how do you build a creative community. The answer lies in pursuing strategies aimed at attracting and retaining creative people in a community, including cultivating diversity and investing in the kind of lifestyle amenities that creative people value. In this context, universities and post-secondary educational institutions can serve as valuable anchors for these strategies – not because they provide the starting point for a linear pathway to innovation and commercialization (as presumed by so many second wave policy initiatives), but because they can act as magnets for the concentration of a talented and tolerant community (Florida 2002, 292). Meric Gertler and Richard Florida have recently ranked Ontario (and Canada's) leading urban centres on the same criteria as Florida used to rank US centres. The study found that the same correlations between diversity and creativity and the location of knowledge-intensive industries hold for Ontario urban centres as held south of the border. Many Ontario centres with a diverse social and cultural population and concentration of talent contain the critical factors needed to thrive as creative communities (Gertler, Florida, Gates, et al. 2002). The challenge lies in mobilizing these assets as part of an 'associative', 'multilevel' and 'joined-up' development strategy.

Part 4: Best Practice: Learning Regions, Innovating Economies

The transition to a knowledge-based economy, with its consequent implications for policy formation in the context of multilevel governance, has the potential to radically alter the design of economic development strategies. As the preceding discussion indicates, the implications of this shift began to influence the thinking of economic development agencies in the 1990s. A number of guiding principles for best policy practice in economic development and business attraction strategies have been identified and a growing number of policy initiatives incorporating this practice can be found in Europe, the US and Canada. While none of the examples discussed in this section of the paper incorporates all of the elements of the best practice model, collectively they point in the direction of a new and more effective approach to economic development policy.

Most significant is the fact that the emerging model has the potential to overcome some of the key sources of traditional weakness ascribed to Canadian economic development policy, namely the lack of a strong state tradition and the inability to locate responsibility for economic development policy in a strong centralized bureaucratic centre or to forge an internal consensus over the direction of economic development policy. In fact, the insights associated with the new model of associative, multilevel and joined-up governance suggest that the very factors perceived as sources of strength for economic development strategies in the old industrial paradigm of the postwar era no longer hold in the emerging knowledge-based economy. The perceived sources of weakness may prove to be exactly the opposite. Similarly new developments at the regional level in Europe and the local level in North America point the direction in terms of overcoming the traditional source of weakness in Canadian industrial policy – the regionalized nature of the economy and the lack of a strong, centralized state tradition.

Regional innovation strategies in the European Union

The current framework for regional innovation strategies in Europe results from a long process of development in regional policy. It originated in 1975 with the establishment of the European Regional Development Fund (ERDF) as a response to the accession of the United Kingdom, Denmark and Ireland to the Community. The most significant change to the ERDF occurred with the passage of the Single European Act in 1986. The creation of the Single Market set in train a further set of reforms to the regional development funds, designed to ensure that the three Structural Funds (including the ERDF) tackled the problems of regional development in a more coordinated fashion (Armstrong 1997, 41–50; Marks 1992, 206–12). One aspect of these reforms was to devote a small proportion of the total funds available under the ERDF to support innovative actions in support of regional development – the Article 10 funds.

In the period leading up to and following the signing of the Maastricht Treaty in 1992, increased emphasis was placed on the issue of social cohesion and particularly, the relation between the goals of increased competitiveness and innovation and the highly uneven fashion in which innovative capabilities were distributed across the less favoured regions (LFR) of Europe. An influential study released in 1992 concluded that ten relatively small local areas, stretching in a band from Greater London through Paris-Ile de France, Rotterdam/Amsterdam, Lyon/Grenoble, Frankfurt, Munich, the Rhine-Ruhr region and Stuttgart to Milan and Turin,

accounted for the vast majority of laboratories and firms engaged in science-based-innovation. These 'islands of innovation' were marked by dense local networks of cooperation between scientific laboratories and the firms engaged in research and innovation. As well, they tended to be the principal participants in the Community's Research and Technology Development (RTD) programs, further contributing to the uneven distribution of innovative capabilities and accentuating the problem of cohesion (Hingel 1992).

The identification of this concentration led to recommendations concerning the need for a stronger geographic dimension in the formulation of the Community's Research and Technology Development programs. In response, the Regional Policy and Cohesion Directorate and the Telecommunications, Information Society and Exploitation of Research Results Directorate, announced the launching of pilot projects in a number of less favoured regions to draft Regional Technology Plans (RTPs). The objective of the pilots was to allow the regions to undertake a detailed analysis of the strengths and weaknesses of the industrial structure in the region. The RTP was to focus on the relationship between the supply of, and the demand for, technology within the region and its implications for economic development. Finally, the results were to be integrated into local, national and Community programs and strategies, with the goal of improving the transfer of technology into networks of SMEs within the LFRs. The conduct of a complete RTP was to take a maximum of two years and the Commission would pay 50 per cent of the cost on a matching fund basis, up to a maximum of ECU 250,000. In the initial phase, RTPs were undertaken in four pilot regions: Limburg (Netherlands), Lorraine (France), Wales (UK) and Saxony (Germany). Subsequently four more pilot projects were launched in Norte (Portugal), Macedonia (Greece), Abruzzo (Italy) and Castilla-Y-Leone (Spain) (Nauwelaers, et al. 1995).

As the initial program evaluations judged the pilot projects to be a success, the European Union extended and expanded the range of innovative projects supported during the next period. In September 1995 the two directorates issued a call for a next round of Regional Innovation Strategies (RS). The shift in name reflected a concern with broadening the exercise beyond a narrow focus on competitiveness based on access to, or the capacity to develop, technology. The RS projects are encouraged to engage a broader definition of innovation that includes managerial, commercial, technical and financial aspects, which promote the introduction of new or improved products or processes, or enable a public or private organization to introduce or improve service delivery. In the period from 1996 to 1999, an additional thirty-three regions in the European Union engaged in Regional Innovation Strategies with partial funding under the ERDF, Article 10 and then a further twenty-five were funded in 1999 under the follow-on initiative to implement the Regional Innovation Strategies.

The primary goal of the program was to overcome the traditional approach of most Community technology programs as top-down and focused on technology push. In contrast, the strategies were to follow a bottom-up approach; they were to be demand-driven, based on the needs identified by firms within the region, emerging out of a dialogue between the firms, regionally based technology transfer organizations and the public sector. The strategies were to reflect a regional approach by forging a consensus among the principal actors at the regional level on the priorities for action. They were to adopt a strategic approach by elaborating a set of short and medium-term objectives for enhancing the technological capabilities and innovativeness of the

firms in the region.¹³ The main 'deliverable' resulting from the program is the design and implementation of a strategic framework for the expenditure of Structural Funds in the region. A key idea was that by expending a small additional sum of money on networking key actors in the region, the RS program could increase the efficiency with which Structural Funds were expended in support of innovation. The approach was to integrate the roles of both the public and private sector in order to increase the overall productivity and competitiveness of the region (European Union 1997, 17). The central assumption that underlay the Regional Innovation Strategies was the importance of social and institutional learning in the emerging knowledge-based economy,

If, as such theories suggest, the innovation capacity of a region is the result of an accumulative learning process, then actions such as Regional Innovation Strategies are based on the premise that this process can be organised and facilitated through the promotion of networks and partnerships among the key regional actors in order to arrive at a 'learning economy' (Landabaso and Reid 1999, 23).

Recently concluded evaluations of the program conducted for the European Commission note a number of positive outcomes. The RS projects have contributed to raising awareness and expanding the scope for innovative activities within the economic development strategies of the regions involved. It has also had a positive effect on the administrative capacity of those regions by contributing to a better coordination of public efforts to support innovation. One of the most visible results in virtually all of the regions was an increased promotion of public/private partnerships and business networks. Virtually all of the regions involved in the second round of RS projects directed a portion of their activities to support cluster development and business networks in their action plans. On balance, the RS projects demonstrate the value and importance of going beyond the provision of supporting physical and technological infrastructures to fostering processes of social learning and cooperation among key components of the local and regional innovation system (Landabaso and Mouton 2002).

A great virtue of the RTP/RS program is that it embodies many of the principles of associative and multilevel governance discussed in Part 3. It overcomes the traditional dichotomy between grass roots or bottom-up approach to local economic development and the top-down, bureaucratic approach that characterizes many of the Commission's initiatives. It brings together interests from the regional, national and supra-national levels to focus on both the opportunities for innovation in the regions and the need of the regions to facilitate their adoption. Most importantly, it links the coordination of strategies at the regional level with the provision of strategic assets from the community and national levels of government. The successful implementation of the RS process requires a number of key ingredients: the participation of a legitimate animateur to stimulate the process, the ability to surmount both individual and institutional rigidities to allow for new forms of dialogue among the participants, and the presence of an innovative and strategic capacity within the public sector to support the process. The other key ingredient of the process is time: it takes time to establish the sustained dialogue

¹³ The Guide to Regional Innovative Actions issued by DG XVI provides a virtual how-to manual on the conduct of successful Regional Innovation Strategies. It specifies that the process should follow six basic steps or themes (European Union 1997, 9-10). The process shares many features in common with the strategic planning process discussed in Part 3 (Montana, et al. 2001), as well as with the sector strategy process implemented in Ontario between 1992 and 1995 (Wolfe 2002c).

that the RTP/RS process needs to let trust relations grow and develop. However, the eventual results more than justify the investment involved (Nauwelaers and Morgan 1999).

Policy learning and innovation in the US: selected examples

Over the past decade many state and local governments have adopted variations on third wave economic development strategies that incorporate key principles discussed in Part 3. Two examples serve to illustrate the general approach. One initiative that has attracted a great deal of attention was the effort by the State of Arizona to analyze its economic strengths and develop cluster strategies. In the early 1990s Arizona faced the same challenges of globalization, economic restructuring and technological change as many other regions in North America. In response, it launched a public-private partnership to analyze the current economic prospects for the state and develop an economic strategy for moving it into the 21st century. The partnership retained SRI International and the Morrison Institute for Public Policy at Arizona State University to provide consulting services for the initiative. The overview document provided a strategic framework for the underlying cluster concepts used to develop the Arizona Strategic Plan for Economic Development (ASPED). The document, in turn, laid the basis for a strategy formation process drawing in over 1000 participants across the state that included representatives from the five sponsoring business organizations, nine industry cluster advisory groups, six foundation working groups focused on broad cross-cutting issues, and a variety regional town halls and public forums. The development strategy employed the cluster concept in three distinct, but interrelated ways: as an *analytical* tool to understand the current strengths and prospects for the state economy, as an *organizational* tool to recruit industry leaders to participate in the development of the regional strategy and promote increased communication within and across clusters; and as a *service delivery* tool to provide a window for improved provision of specialized services to industries in the state. In the words of one consultant who participated in the initiative, “a best practice to emerge from Arizona’s experience with cluster analysis is the use of cluster working groups to help policy makers better understand an industry, the challenges it faces, and the most valuable assistance government can provide” (Waits 2000, 39; Henton, et al. 1997, 44–45).¹⁴

Despite the general characterization of Silicon Valley as being relatively weak in social capital, one recent initiative, the creation of Joint Venture: Silicon Valley, and its subsequent impact on improving the quality of civic engagement in the Valley has drawn considerable attention. Three key participants in this venture argue that the concentration of a large number of firms is not sufficient to transform a particular locale into a vibrant and dynamic cluster linked into the global economy. It requires the presence of an ‘economic community’ – places with strong, responsive relationships between the economy and community that afford both companies and the community a sustained advantage. Based on the authors’ experience working with community-based initiatives such as Joint Venture: Silicon Valley, they agree that social capital is a critical ingredient in the success of the most dynamic clusters. They maintain that social capital can be created and the basis for doing so is the establishment of collaborative networks between various elements of the business and civic communities. The catalyst for doing so is a new breed of civic entrepreneurs, individuals who lay the basis for social capital by finding the opportunities for individuals to work together on projects to promote the community’s economic prospects. The essential criterion for their success is finding the appropriate mechanisms to engage key members

¹⁴ Doug Henton identifies many other urban centres in the US that share similar characteristics of strong community leadership, including Cleveland, Silicon Valley, Wichita and Austin.

of the community in a sustained effort to advance its opportunities (Henton, Melville, and Walesh 1997, 31).

Another key strategy adopted by state and local governments has been to focus their efforts on attracting high profile federal research initiatives, rather than individual firms, to locate in their community. The classic example of this strategy is found in the case of Austin, Texas and its success in becoming the home for the Micro-Computer and Electronics Corporation (MCC) and subsequently, Sematech. MCC was founded in 1982 as an industry-funded initiative to undertake high-risk, long-range research aimed at significant advances in microelectronics and computer technology. Shortly after its founding it initiated a nationwide search to find a home base for the consortium. Literally dozens of municipalities across the US mobilized local efforts, often with state support, to win the competition. The coordinated strategy developed by Austin was led by the IC² Institute at the University of Texas in Austin and the state government. Under the leadership of the IC² Institute, key leaders in the local chamber of commerce and key faculty and administrators at the University, they launched a concerted effort to promote the growth of high-tech entrepreneurship in the Austin area. Building on the base of existing technical branch plants located there in the 1960s, the strategy achieved a significant number of successes in the form of new entrants to the industry, such as Dell Computers, who were able to build upon the electronics base created by the technical plants, a number of government installations and a substantial investment by the university in the field. Especially important was the \$4 billion endowment of the university, which allowed it to make critical investments in key areas of research and to leverage even larger sums of private and federal investment. The ultimate success of this strategy was demonstrated when Austin succeeded in attracting the two national high technology consortia established in the 1980s, the Microelectronics and Computer Consortia and Sematech – through the provision of land and buildings for their location, supplemented with a heavy investment by the University in its computer science and electrical engineering units. The key development that galvanized the development strategy for Austin was the formation of a coalition that included the Chamber of Commerce, the Chancellor's office at the University, a number of key faculty, and state government officials, in its competition with dozens of other communities to attract the MCC to the city. As a result of its efforts to attract these major infrastructural investments to its community Austin is widely recognized as one of the dynamic growth poles in the US economy (Gibson and Rogers 1994; Henton, et al. 1997, 42–44).

Not surprisingly, Austin, Texas also ranks high on most of the measures used by Richard Florida to determine the presence of a creative community. Austin ranks second overall in his Creativity Index (behind San Francisco) and fourth on the talent and tolerance indices. In his account of how Austin has moved rapidly to the forefront of technology centres in the US over the past two decades, Florida acknowledges the contribution made by community leaders to building its technology base and by the University of Texas in investing heavily in talent and attracting hundreds of millions of federal and state research dollars. However, he maintains that an equally important factor has been the efforts made by the community to enhance the local lifestyle and cultural scene through investments in musical events, film and music festivals and upgrading the part of the city with the greatest concentration of bars and nightclubs. A key element of the city's development strategy has been to preserve its unique cultural assets and maintain its laid-back, progressive lifestyle (Florida 2002, 299). It is not coincidental that Austin combines a strong presence of the kind of 'civic entrepreneurs' that provide the leadership for community development with a commitment to maintaining and enhancing the factors that make it a 'creative community'.

Canadian approaches to economic development and social learning

Innovative Canadian approaches to economic development have not been acknowledged to the same extent as those in Europe and the US. Yet remarkably there have been a number of novel initiatives at both the federal and provincial levels that demonstrate some of the underlying principles discussed in this paper. These initiatives can serve as guideposts for the direction that future economic development initiatives should take. One current initiative that provides a good illustration of the potential for multilevel governance in the Canadian federation are the Urban Development Agreements in Western Canada between the federal government's economic development agency, Western Economic Diversification (WED), three provincial governments and the municipalities of Winnipeg, Edmonton and Vancouver.

The Winnipeg Development Agreement was a five-year tripartite agreement with a budget of \$75 million and a mandate to implement a number of programs in the areas of community development, labour force development, and strategic and sectoral investments. The Edmonton Economic Development Initiative (EEDI) was signed in 1995 and is unfunded but is designed to streamline program coordination between the three levels of government and to seek out resources to support proposed projects. The process of identifying potential projects is driven by the city and all three partners must agree to projects. An example of a successful project is the Edmonton Capital Region Innovation Centre to promote commercial spin-offs from the local science base by taking advantage of opportunities arising from early stage research and prototype development. The Centre was facilitated through the EEDI with financial support from the Economic Development department in Edmonton, the province, the Alberta Research Council, the National Research Council and WED. The Vancouver Agreement is for five years running until 2005 and covers a broader range of issues, including health and safety, economic and social development and community capacity building. The Vancouver Agreement uses existing mandates, authorities and programs to fund initiatives (OECD 2002, 161–62). While the overall size and impact of these three agreements is relatively small, their real significance lies in the way that they focus on capacity building and leveraging existing institutional and financial resources in a spirit of multilevel and joined-up governance.

While Ontario lacks the strong presence of a federal development agency throughout the province (FedNor's mandate applies primarily to the North), it has nonetheless developed some interesting experiments in associative and multilevel governance. The prime mover behind a number of these initiatives has been the Urban Economic Development (UED) Branch of the Ministry of Enterprise, Opportunity and Innovation. The Branch originated with the appointment of a Special Adviser on Urban Economic Affairs in May, 1998. The approach adopted by the UED from the outset has been to pursue a more effective strategic alignment of existing resources in the provincial government for supporting research, post-secondary education, urban development and health to promote urban economic development. A key part of its mandate is to build strong linkages between provincial and local economic development organizations in Ontario's urban regions to better align objectives, actions and investments.

The Branch's focus is on the development and implementation of economic strategies and partnerships to advance industry clusters in urban regions. It works with other branches of its own Ministry, as well as other ministries and economic development/business organizations, both provincially and in large urban regions, to increase the capacity and effectiveness of economic development stakeholders to support economic development in Ontario's urban regions. It does so by working with local partners to refine and implement specific economic

development initiatives in their communities, in part by developing new, innovative approaches to urban and regional development. Its mandate also includes broadening local partners' awareness of economic development best practices in competing urban regions across Canada, the United States and other OECD countries. UED works with a broad cross-section of stakeholders at the local level that cut across all three levels of government. In this regard, both its mandate and operating approach reflect the basic principles of associative and multilevel governance.

UED has been involved with several recent initiatives across the province that warrant closer attention. In both Ottawa and Toronto the Urban Economic Development Branch launched major cluster studies in partnership with local economic development agencies and community-based groups to chart the competitiveness of the leading clusters in the local economy and their prospects for growth (ICF Consulting 2000b; ICF Consulting 2000a). In both cases, the method of analysis used was similar; however, the broader process in which the visioning or foresight exercise was grounded differed dramatically. In the case of Toronto, the study was done by a US consulting firm in partnership with local consultants and under the direction of the Economic Development and Planning Offices of the City of Toronto. The study fed directly into the formation of the Toronto Economic Development Strategy. The recent OECD review of Territorial Policy and urban initiatives in Canada paints a broadly positive picture of the process, suggesting that it "benefited from the active involvement of business, labour, academic and community leaders" (OECD 2002, 156). However, interviews with participants in the process paint a less sanguine picture of the degree of community engagement with the Toronto cluster study. In contrast with the experience in Ottawa, there was little in the way of the broader participatory mechanisms to engage key members of the community in the effort, nor did it involve the committed, creative and collaborative leadership described above as essential to the success of such exercises. In part, this approach reflects the traditional absence of a strong cohesive leadership in Toronto committed to the economic success of the entire city-region, as well as the lack of key 'civic entrepreneurs' in the economic or political sphere willing to assume leadership of the cluster strategy process. The inability to mobilize creative and collaborative business leaders from the economic sphere and the failure of civic entrepreneurs to emerge from other areas of community life has undermined the ability of the region to take full advantage of its foresight or 'visioning' exercise.

The shortcomings revealed by the process associated with the original Toronto cluster study have been overcome in the past year by a new initiative termed the Toronto City Summit and the subsequent formation of the City Summit Alliance. The original City Summit was a one-day event organized in June 2002 on the initiative of the Mayor's office and with strong participation from a number of community organizations including the United Way and the Canadian Urban Institute. The Summit brought together a diverse group of leaders reflecting the many communities that comprise the urban area to assess the region's strengths and challenges and frame an agenda to respond to those challenges. Following on the successful conclusion of the Summit a coalition of more than forty civic leaders from the private, labour, voluntary and public sectors came together to form the Toronto City Summit Alliance. The Alliance worked through the following eight months with staff resources committed by a number of organizations to produce its own analysis of the current economic and social situation of the region and formulated its own action plan. The plan, released in April, 2003, sets out a broad agenda for change in a number of areas including physical infrastructure, tourism, the research infrastructure, education and training, immigration and social services. The release of the report

was followed up with a second Summit held in June 2003 and the commitment to proceed on a number of key initiatives, including the proposal for a Toronto Region Research Alliance (Toronto City Summit Alliance 2003). What is unique about the City Summit Alliance is that the leadership for it has come almost entirely from the private and voluntary sector, true 'civic entrepreneurs', yet the process has included many of the elements of community-based strategic planning discussed above.

The competitive study of Ottawa's clusters reflected the social makeup of the economic community in the region from the outset. A key factor that differentiates the Ottawa clusters from those in Toronto and other regions in North America is the strength of the local 'institutions of collaboration' and the high degree of social capital that they generate. The linchpin of these institutions is OCRI, the Ottawa Centre for Research and Innovation, a not-for-profit organization dedicated to helping the city's technology community shape its economic future. Founded in 1983 as a collaborative effort among partners from industry, the regional municipality, the local institutions of higher education and federal laboratories, OCRI currently has about 700 members and a budget of \$4.5 million. OCRI sponsors a wide range of corporate programs that involve up to 120 events annually and afford the members of the Ottawa area clusters with a virtually unlimited range of networking opportunities. OCRI is also involved in a dense network of partnerships with many of the federal and provincial organizations discussed above aimed at strengthening the region's innovation capabilities. These partnerships include provincial Centres of Excellence, working relationships with the Ottawa-Carleton Manufacturers Network and the Ottawa Photonics Cluster, and joint ventures with the National Research Council's Regional Innovation Centre and Vitesse program.

OCRI was also closely involved with the Economic Generators Initiative in 1999-2000 that was launched under the auspices of The Ottawa Partnership, a group of public and private leaders committed to advancing the local economy. The mandate of TOP "is to provide leadership and advice at a strategic level, on action required to improve and grow Ottawa's economy" (ICF Consulting et al., 2000b, p. i). The membership of TOP includes the chairs of the region's business and economic development agencies, and representatives of its municipal council, the higher education sector, and the business community at large. The TOP leadership decided to undertake a detailed study of the region's 'economic generators' as one of its first priorities and to use the study to prepare a strategic plan for the further development of the key engines driving the local economy. One of the consultants involved in the study commented in a local paper that the level of community involvement was higher than in any comparable study he had done in the US or Canada. More than three hundred individuals participated in the work of the various cluster groups that formed part of the visioning exercise and helped formulate a total of thirty three specific goals intended to promote the growth of the seven key clusters identified as the growth generators for the regional economy.

The exercise also produced a higher-order set of flagship initiatives designed to work across the individual clusters to benefit the regional economy as a whole. The high level of participation in the Economic Generators Initiative engendered great expectations in the region about the results that would follow from the presentation of the report in June 2000. Unfortunately, it was released just as the high tech sector entered a serious downturn. Despite the impact of the recession, The Ottawa Partnership, in cooperation with local economic development agencies and the municipal council, forged ahead with planning for many of the cluster and flagship initiatives outlined in the report. Ten of the thirty-three cluster initiatives have achieved tangible results. New steps have

been taken to strengthen the region's photonics and biotechnology clusters with the formation of the Ottawa Biotechnology Incubation Centre (OBIC) and the Ottawa Photonics Research Alliance (OPRA) respectively.

A review and update of the report was released in January 2003 (ICF Consulting 2003). A key goal set out in the updated report was to re-energize the cluster approach developed in the initial Economic Generators Initiative. The objective is to engage the individual clusters identified in the initial report to work together with a range of community partners to strengthen each element of the City's innovation system and to collaborate together on the flagship initiatives designed to strengthen all the clusters. The current report, *Innovation Ottawa*, sets out a strategy for strengthening the links between the region's research infrastructure – especially its post-secondary education sector and national laboratories – and the local sources of enterprise within existing and emerging clusters. The report elaborates a vision of what the region should aspire to become which includes: a leading example in North America of a truly networked and collaborative region that mobilizes its information infrastructure to link every firm and institution; a home to a disproportionately large share of the 'creative class'; an integrated region that successfully brings together the elements of research, development and commercialization; and a dynamic region that generates a diverse and continually evolving set of clusters (ICF Consulting 2003, 3).

It goes on to build upon the focused and strategic initiatives set out in the first report. These initiatives are organized around three sets of thematic actions:

- to build a critical mass of the region's existing scientific and knowledge base, exploit that base more effectively and build better linkages between different aspects of the local innovation system; foster better downstream linkages between the region's research and knowledge infrastructure and its existing and nascent clusters;
- to generate an increased number of spinoffs from the region's R&D activities by growing the institutional entrepreneurial culture and developing R&D intermediaries to bridge the gap between the scientific research community and industry; and
- to increase the formation and survival of innovative enterprises by expanding the region's business incubation system, growing pilot and contract manufacturing capacity and promoting firm attraction, formation and expansion in clusters.

Finally the report calls for continuing efforts to build the networking capacity and social capital that underlies the Ottawa region's clusters by facilitating the growth and interaction among elements of the region's dynamic clusters (ICF Consulting 2003, 80–89).

One other initiative that the UED has been involved with is the Ontario Competitive City Regions Partnership (OCCR). The Ontario Competitive City Regions (OCCR) Partnership came together in 2000 to work with Ontario's principal urban centres to support the efforts of civic leaders, educators and the private sector to develop strategies for regional growth. The OCCR is a partnership of five government agencies and two academic organizations. Represented are the Office of Urban Economic Development and the Science and Technology Awareness and Innovation Branch at Ontario's Ministry of Enterprise, Opportunity and Innovation, Industry Canada, FEDNOR, Human Resources Development Canada, the Office for Partnerships for Advanced Skills of the Council of Ontario Universities and CON*NECT of the Association of

Applied Arts and Technology of Ontario. The partnership has retained the Canadian Urban Institute to work with communities that wish to organize a symposium of their own.

The OCCR Partnership has piloted several regionally focused symposia across the province in city regions with greater than 100,000 people and at least one university and one college. OCCR Partnership's goal is to promote discussion among stakeholders that will lead to regional action plans and initiatives linking educational assets to economic and human development strategies. The overall goal is to generate additional networks, and strengthen existing linkages, between key pillars in competitive city-regions: universities/colleges; SMEs; venture capitalists/angel investors; local skills/training/educational organizations; municipal/provincial/federal governments; and economic development entities. The specific goals are to facilitate discussion among stakeholders about how they are managing the transition to the new economy and promote a sharing of best practices, thus enabling actions to build the competitiveness of city regions in the knowledge economy. They are also aimed at generating additional, or strengthening existing, linkages between key pillars in competitive city-regions: universities/colleges; SMEs; venture capitalists/angel investors; local skills/training/educational organizations; municipal/provincial/federal governments; and economic development entities.

A total of eight symposia have been held in Peterborough, Ottawa, Sudbury, Hamilton, Thunder Bay, York Region Kingston, Guelph, and Mississauga. Each of the symposia exhibited a strongly local flavour. The event in Peterborough was organized by the Economic Development Office of the Peterborough area and focused on the potential to develop an environmental technologies cluster in the region. The event in Sudbury was organized with the participation of FedNor and involved several events that focused on the potential to develop three clusters in the area, mining, life sciences and tourism/retail. The event in Ottawa was organized by OCRI as part of the larger agenda for the region set out by The Ottawa Partnership in its planning and strategy document. The workshop focused on the possibility of implementing Talentworks, one of the key cross-cluster initiatives recommended in the TOP report. The next stage will involve a consultation on the implementation of the strategy. In this case, the OCCR workshop was less a stand alone event, and more a part of the larger process that has unfolded in Ottawa with respect to the community-based strategic planning process launched as a cooperative venture between the City, Ontario's Office for Urban Economic Development and other local actors.

The OCCR Partnership organized an event in December 2002 to analyze the lessons learned from the symposia organized to date. The participants agreed on a number of common lessons. There was a general consensus that the symposia were useful for triggering interest in the issues of regional economic development in their respective city regions, but that they were insufficient by themselves. There was a strong desire that the initial symposia should be part of an ongoing process that would build upon the new partnerships forged through the initial events. They also agreed that most of the city regions were at different stages of development and that the next level of activity should take that variation into account. The participants recommended that OCCR continue to work with communities to implement the action plans they had developed and that OCCR should develop a more permanent structure to enable it to work with communities on an ongoing basis.

One other recent initiative launched by the Ontario government, the Biotechnology Clusters Innovation Program (BCIP), warrants consideration in this context. The provincial Minister of Enterprise, Opportunity and Innovation launched Ontario's Biotechnology Strategy on June 7,

2002. As part of that strategy, the government announced a new program initiative: the Biotechnology Cluster Innovation Program (BCIP), which is designed to accelerate the development of biotechnology clusters by supporting the commercialization of infrastructure projects – ranging from business incubators to angel investor networks. The program consists of two distinct phases. In the first phase, the government will support the development of plans that address the innovation capacity of Ontario's regional biotechnology clusters. The province is providing funding up to a maximum of \$200,000 on a matching basis, to regional consortia for the development of a Biotechnology Cluster Innovation Plan. The second phase of the program will support the development of infrastructure such as commercialization centres, research parks and other regional initiatives that promote entrepreneurship and innovation. To date, eleven regional consortia have come forward with expressions of interest in developing cluster innovation plans. The program displays many of the positive features of bottom-up strategic planning that have been described in the preceding sections.

Lessons for Ontario: Principles, Institutions, Practices

The preceding examples present a clear picture of an emerging paradigm for economic development policy based on the underlying principles of associative, multilevel and joined-up governance. This paradigm is predicated on a number of key assumptions. While old style industrial policies and first wave business attraction strategies have long since been abandoned in theory, they continue to play a role in strategic sectors and specific cases. It is unlikely that they can be ignored completely, especially in sectors such as auto, and it is necessary to have a strategic view of how to respond to individual cases. No government in Ontario has been able to avoid confronting this issue since 1980 and it is unlikely that future ones will be spared the necessity of doing so. The recent spate of new auto investments in the southern US states accentuates the continuing challenges of inward investment and renewed product mandates the province faces. Given the continued prevalence of these policy approaches in most US jurisdictions, it is likely that Ontario will have to compete for these investments. The critical issue is how to leverage the maximum economic benefit for the province with the minimum commitment of public resources. A fundamental requisite of effective policy in this area will be the presence of a strong unit within the public sector to serve as a repository of sector critical skills and knowledge, such as existed from the early 1980s to 1995.

This raises the broader question of whether the existing bureaucratic structures in the Ontario government are well suited for the challenge of economic development policy in the emerging paradigm. A study of the province's principal economic development ministry over the past two decades would reveal that an inordinate amount of its time and effort have been expended in bureaucratic reorganizations. These processes can be incredibly time consuming for those directly involved and distract public servants from the broader challenge of fulfilling their policy mandate. While there is no accepted methodology for a cost/benefit analysis of bureaucratic reorganizations, anecdotal evidence suggests that the benefits of the effort rarely outweigh the costs in terms of time expended and loss of focus. The current challenge for economic development policy is less one of ensuring that the organization of the public bureaucracy 'has got it right', than of ensuring that public sector agencies learn to work in a new and more effective way, embodying the principles of associative, multilevel and joined-up governance.

The same recommendation applies to the current mix of policies and programs – provincial and federal – available to support innovation and economic development. The new wave of

innovation policies and programs and the second wave of economic development strategies that gained support in the 1980s and 1990s created a dense network of research institutions and technological infrastructure. These initiatives at both the federal and provincial level have strengthened the research capacity of the province and the increased emphasis on research-industry linkages has also improved the knowledge flows within the regional innovation system. On the downside, they have led to a plethora of programs and policies that make it virtually impossible for bureaucrats, let alone private firms, to track them all. One recent inventory compiled by Industry Canada in New Brunswick identified 180 different R&D funding programs offered just by federal departments and agencies – and this list does not include provincial funding, or the full range of program supports available for economic development.

A key challenge for economic development policy in the emerging era is to ensure a better integration and coordination of available programs and policy instruments. As much of the preceding analysis argues, this can best be accomplished at the level of the local and regional economy from the perspective of strategic clusters or local and regional innovation systems. It also requires a greater degree of coordination between all three levels of government and their respective economic development agencies. No one level of government has a monopoly on the policy instruments and approaches necessary for an effective economic development strategy. Multilevel governance is no longer an interesting academic concept of relevance to our European counterparts alone, but has become highly relevant to the challenge of economic development in the Canadian federation. Many of the existing policies and programs have been implemented in a traditional top-down, bureaucratic fashion, administered by individual departments or agencies with little cross-jurisdictional coordination and often little attention paid to the broader implications of the program for cluster development in the local or regional innovation system. One illustration of this dilemma is the Canada Foundation for Innovation, which makes major infrastructural investments in expanding the research capacity of post-secondary institutions and hospitals across the province with little regard to the integration of these important new facilities into the existing or emerging industrial structure or local clusters of those regions. Finally, research and innovation programs must be better aligned with the needs and demands of existing sectoral groups and industry clusters in the dynamic growth regions of the province.

The coordinated approach to economic development policy and strategic planning at the community level advocated in this paper is predicated on the existing set of bureaucratic structures and program mix at all three levels of government. What is required is a more integrated and joined-up approach to policy planning at the ‘governance’ level, rather than a new round of institutional renovation at the federal, provincial or local level. The approach put forward here is not new. As the discussion in the preceding sections make clear, it has been applied in a number of different contexts in Ontario – the sector strategy development process in the early 1990s, the cluster development process in leading urban centres in the province, the Ontario Competitive City Regions initiative and most recently the Biotechnology Cluster Innovation Program, as well as the Smart Growth panels across the province – all evince elements of the approach to economic development policy envisioned in this paper. The key challenge is to extend the approach to a broader cross-section of provincial economic development policy and to use the resulting planning exercises as a central criteria for allocating existing federal and provincial program dollars. The strategic planning approach to economic development policy is not conceived as a massive new spending program, but rather a new set of criteria to be used in determining the allocation of existing program dollars in the economic development policy envelope. At most, the provincial or federal government might chose to use

relatively small amounts of new program funding to stimulate the kind of planning exercises described above, as in the case of the BCIP, but they should also recognize that many existing programs at both the federal and provincial levels currently contain budgetary allocations that can be applied for this purpose (OECD 2002).

Effective economic development policy must not be conceived as the exclusive responsibility of government bureaucracies, but rather, must build on the successful experiments with associative governance, both in this jurisdiction and those of our competitors. There is a growing recognition that economic development policies work most effectively when the direct beneficiaries of those policies and programs play a direct role in both their design and implementation. This involves developing a rolling set of innovation strategies at the cluster, local and regional level to ensure that the existing R&D infrastructure and economic development programs are used to maximum advantage – to assess existing needs and identify gaps in the program array. It is also important to engage in a constant process of monitoring the best policy practice in competitor jurisdictions to ensure that Ontario approaches the continuing challenge of economic development in a *reflexive* manner that allows it to pursue a path of *social learning*. Recent policy initiatives in the province, and a growing interest in, and willingness to cooperate across jurisdictions and between the public and private sectors indicates that we have begun to move along this path. The time has come to build on these initial successes and advance the pace of social learning.

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Tables

Table 1: Ontario employment, 1960-2001

Year	Unemployment rate (%)	Total employment ('000)	Ontario Labour Force ('000)
1960	5.4	2,249	2,377
1961	5.5	2,269	2,401
1962	4.3	2,317	2,422
1963	3.8	2,382	2,476
1964	3.2	2,473	2,556
1965	2.5	2,548	2,614
1966	2.5	2,651	2,719
1967	3.1	2,745	2,834
1968	3.5	2,830	2,934
1969	3.1	2,936	3,032
1970	4.3	2,996	3,130
1971	5.2	3,079	3,249
1972	4.8	3,218	3,381
1973	4.0	3,366	3,509
1974	4.1	3,519	3,671
1975	6.0	3,581	3,810
1976	6.1	3752.9	3994.7
1977	6.8	3810.7	4089.4
1978	7.1	3926.8	4228.1
1979	6.5	4093.9	4380.2
1980	6.8	4163.7	4469.2
1981	6.5	4289.6	4590.2
1982	9.7	4201.5	4653.3
1983	10.3	4252.7	4742.5
1984	8.9	4411.5	4844.2
1985	8.1	4555.7	4956.3
1986	7.0	4722	5078.7
1987	6.1	4892.5	5208.9
1988	5.1	5082.7	5353.7
1989	5.1	5193.4	5469.8
1990	6.2	5191.3	5533
1991	9.5	5015.7	5543.8
1992	10.7	4948.9	5541.5
1993	10.9	4973.8	5581.1
1994	9.6	5039.2	5574.3
1995	8.7	5130.6	5619.7
1996	9.0	5180.8	5695.3
1997	8.4	5313.4	5801.4
1998	7.2	5490	5914.3
1999	6.3	5688.1	6070.8
2000	5.7	5872.1	6227.9
2001	6.3	5962.7	6364.4

Source: Statistics Canada, CANSIM, Historical Statistics of Canada

Table 2: Sectoral composition by % employment, selected years, 1955-2001

Year	Primary Industry	Secondary Industry	Tertiary Industry
1955	13.7	38.3	48.0
1961	9.6	33.3	57.1
1971	6.1	33.5	60.4
1975	4.7	30.8	64.5
1981	4.6	30.2	65.2
1991	3.3	18.0	71.7
1996	2.9	17.4	73.6
2001	2.0	18.2	73.1

Sources: Rea, K. The Prosperous Years, The Economic History of Canada, Ontario Statistics, 1986

Year	Total employment	Primary	Secondary	Primary and Secondary
1981	4,289,600	197,322	1,295,459	1,492,781
2001	5,962,700	119,254	1,085,211	1,204,465

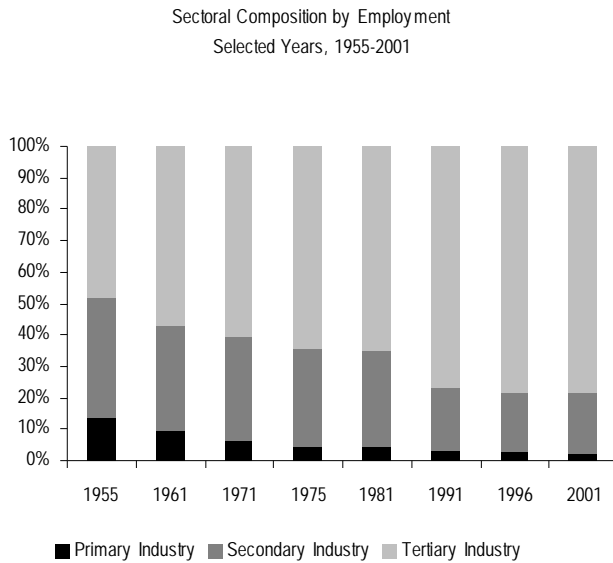


Table 3. Top ten Ontario manufacturing industries, selected years, 1965-1999

1965			
Industry	Value of shipments & other revenue (\$'000)	%, top ten	%, all industries
Transportation equipment	3,656.8	22.5	18.6
Food & beverage	2,967.9	18.3	15.1
Primary metals	1,743.7	10.7	8.9
Fabricated metal	1,588.2	9.8	8.1
Electrical products	1,503.7	9.3	7.6
Chemical	1,359.0	8.4	6.9
Machinery	1,210.8	7.5	6.2
Paper	1,034.6	6.4	5.3
Printing & publishing	602.9	3.7	3.1
Non-metallic mineral	555.3	3.4	2.8
Total - Top ten industries	16,222.9	100.0	82.4
All industries	19,677.8		

1975			
Industry	Value of shipments & other revenue (\$'000)	%, top ten	%, all industries
Transportation equipment	12,857.1	28.7	24.1
Food & beverage	7,538.1	16.8	14.1
Electrical & electronic	4,023.5	9.0	7.5
Primary metals	4,019.0	9.0	7.5
Fabricated metal	3,951.6	8.8	7.4
Chemical	3,594.2	8.0	6.7
Machinery	3,083.9	6.9	5.8
Paper	2,291.1	5.1	4.3
Refined petroleum & coal	1,761.9	3.9	3.3
Rubber & plastic	1,622.2	3.6	3.0
Total - Top ten	44,742.6	100.0	83.9
All industries	53,355.9		

1985			
Industry	Value of shipments & other revenue (\$M)	%, top ten	%, all industries
Transportation equipment	51,471.3	37.3	32.0
Food & beverage	18,623.2	13.5	11.6
Chemical	12,625.7	9.1	7.8
Electrical & electronic	10,802.1	7.8	6.7
Primary metals	10,066.3	7.3	6.3
Refined petroleum & coal	8,881.1	6.4	5.5
Fabricated metal	8,504.7	6.2	5.3
Paper	6,264.2	4.5	3.9
Machinery	5,456.9	4.0	3.4
Printing & publishing	5,345.9	3.9	3.3
Total - Top ten	138,041.4	100.0	85.7
All industries	161,035.3		

1995			
Industry	Value of shipments & other revenue (\$M)	%, top ten	%, all industries
Transportation equipment	98,637.3	46.6	38.4
Food & beverage	21,867.2	10.3	8.5
Electrical & electronic	20,277.7	9.6	7.9
Chemical	17,753.5	8.4	6.9
Primary Metals	14,164.0	6.7	5.5
Fabricated metal	12,549.2	5.9	4.9
Machinery	8,889.1	4.2	3.5
Rubber & plastics	6,350.3	3.0	2.5
Refined petroleum & coal	5,935.5	2.8	2.3
Paper	5,052.2	2.4	2.0
Total	211,476.0	100.0	82.3
All manufacturing industries	257,033.3		

1999			
Industry	Value of shipments & other revenue (\$M)	%, top ten	%, all industries
Transportation equipment	121,701.1	44.8	39.5
Food & beverage	35,206.2	13.0	11.4
Chemical	22,551.4	8.3	7.3
Primary Metals	15,855.4	5.8	5.1
Fabricated metal	15,470.1	5.7	5.0
Computer & electronic	14,724.5	5.4	4.8
Rubber & plastics Products	14,032.5	5.2	4.6
Machinery	13,359.6	4.9	4.3
Paper	9,639.1	3.5	3.1
Refined petroleum & coal	9,169.5	3.4	3.0
Total - Top ten	271,709.4	100.0	88.1
All manufacturing industries	308,375.9		

Table 4. Top ten exporting sectors in Ontario, 1999.

Industries	Exports (\$M)	Share of total Ontario exports (%)	Imports (\$M)	Balance (\$M)
Motor vehicles and parts	80385	41.1	48209	32176
Machinery and mechanical appliances	23752	12.1	44408	-20656
Electrical machinery and equipment	9685	5.0	27089	-17404
Plastics and plastic articles	6073	3.1	7587	-1514
Non-ferrous metals and allied products	5987	3.1	7084	-1097
Pulp, paper and allied products	5850	3.0	4040	1810
Furniture and fixtures	4828	2.5	3794	1034
Prepared food, beverage, and tobacco	3862	2.0	4574	-712
Articles of iron and steel	3279	1.7	4319	-1040
Precious metals, stones, and coins	3247	1.7	1598	1649
Total (all sectors, Ontario)	195,523	75.3	211,412	-15,889
Total (all sectors, Canada)	365,233		326,843	38390
Ontario as a share of Canada	53.5		64.7	

Source: Ontario Ministry of Finance, 1999, *Ontario Economic Outlook and Review*.

Table 5. Major Automotive Investments in Ontario

Completion Date	Project	Investment (\$ millions)
1992	Ford - New Oakville Paint Plant	439
1992	Chrysler - retooling Bramalea Assembly Plant	600
1992	Freightliner - new St. Thomas Assembly Plant	30
1993	Ford - new Windsor Cosworth Aluminum Casting Plant	200
1993	Ford - retooling Oakville Assembly Plant	560
1994	GM - retooling Windsor Transmission Plant	300
1994	Ford - expanding Windsor Essex Aluminum Casting Plant	100
1995	Ford - reopening Windsor Ensite Engine Plant	1,000
1995	Toyota - new Cambridge Engine Assembly Plant	30
1995	Chrysler - expanding Windsor Assembly Plant	600
1996	Honda - expanding Alliston Assembly Plant	20
1996	Ford - expanding Oakville Truck Plant	400
1997	Toyota - expanding Cambridge Assembly Plant	600
1997	Ford - expanding Windsor Engine Component Plant	650
1998	Honda - expanding Alliston Assembly Plant	300
1999	Toyota - expanding Cambridge Assembly Plant	650
2000	Ford - expanding Windsor and Essex Engine Plants	1,600
	Ford - expanding Oakville Assembly Plant	1,000
	Ford - new paint facility at St. Thomas Assembly	150
2000	Daimler Chrysler - expanding Windsor Pillette Assembly Plant	1,500
		500
	Damler Chrysler - expanding Joint R&D Centre at University of Windsor	
2000	GM - expanding St. Catharine's Engine Plant	440
	GM - expanding Oshawa Assembly Plant	300
	GM - expanding Oshawa Metal Centre	100
2002	Toyota - expanding Cambridge Assembly Plant	TBA

Sources: Ontario Ministry of Finance, 1994, "Ontario on the Job and Looking Ahead", p. 15, 1994; Press releases and company websites.

Table 6. Output by industry for Ontario manufacturing, 1989 and 1999, in millions of 1992 dollars

Industries	1989	1989 per cent share	1999	1999 per cent share	Growth rates between 1989 and 1999 (%)	Share of total manufacturing GDP improvement (%)
Printing and publishing	4795	8.3	3403	4.6	-29	-8
Non-metallic mineral	1937	3.4	1837	2.5	-5	-1
Leather	308	0.5	112	0.1	-63	-1
Clothing	1034	1.8	794	1.1	-23	-1
Beverage	1619	2.8	1540	2.1	-4	0
Paper and allied products	2406	4.2	2360	3.2	-1	0
Refined petroleum and coal	389	0.7	465	0.6	19	0
Machinery	3116	5.4	3335	4.5	7	1
Primary textile	586	1.0	744	1.0	26	1
Wood	1111	1.9	1354	1.8	21	1
Primary metal	3314	5.7	3420	4.6	3	1
Rubber	803	1.4	1408	1.9	75	3
Furniture and fixture	1161	2.0	1883	2.5	62	4
Food	5752	10.0	6450	8.6	12	4
Fabricated metal	4928	8.5	5840	7.8	18	5
Plastic	1426	2.5	2314	3.1	62	5
Chemical	4606	8.0	5724	7.7	24	7
Electrical and electronic	4550	7.9	8275	11.1	81	22
Transportation equipment	11214	19.4	19998	26.8	78	52
Other manufacturing	2653	4.6	3286	4.4		
All Manufacturing	57676	100.0	74672	100.0	29	100

Source: Statistics Canada, 2001, *Provincial Gross Domestic Product by Industry, 1992-1998*. Cat. No. 15-203.