

Exploring Telework as a Long-Range Planning Strategy for Canada's National Capital Region

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The concept of telework, or working at a location other than the usual office, is receiving increasing attention. Telework is steadily becoming of more benefit as computers and telecommunications services continue rapid innovation and gain popularity. There are a number of important reasons to explore telework in Canada's capital region. The practice of telework is advancing despite the absence of guiding policy for federal employees and departments. Requirements for more flexible work environments and arrangements are increasing. Costs of office space in downtown Ottawa and Hull continue to increase. Computers and communications equipment are more affordable. Traffic congestion is growing, which slows travel and results in additional costs to the user and to the regional economy. The manner in which the National Capital Commission is dealing with telework as a planning issue is reported. A 1988 survey of the attitudes of senior federal managers toward telework in Canada's capital region is described. The public policy environments for telework are examined, several transportation and planning issues interacting with telework are identified, and opportunities for improved understanding and application of telework toward the future of Canada's capital are suggested.

Telework is becoming a more desirable work arrangement as the number of information employees increases and as communications technologies continue rapid innovations. With computers, modems, and reliable telecommunications, the workplace is no longer constrained to its traditional boundaries. This has important implications for urban transportation, management of travel demand, land use distribution, and the quality of life in Canada's national capital region (NCR). In its capacity as planner for all federal lands in the capital contributing to the shape and development of the capital region, the National Capital Commission (NCC) continues to explore these implications with regard for the distinct nature, character, and function of the capital.

NCC has, to date, sponsored a qualitative study of telework in the NCR and collaborated on a survey of the attitudes of senior federal decision makers in the NCR toward telework. The results of these studies and other pertinent research are helping planners understand the long-range influences of telecommunications on the future evolution of the NCR, including the interactions between telecommunications and transportation, effects on travel demand, and impacts on spatial pattern of urban and regional land use.

The focus of planning research at NCC is to identify and examine the organizational, social, and legislative issues asso-

ciated with telework; to evaluate the feasibility of telework as an alternative work arrangement for federal employees; and to examine the effects of telework on land use and transportation.

CAPITAL SETTING

The NCR is the fourth-largest metropolitan area in Canada, having an estimated population of 828,000. Metropolitan Toronto is the largest, with a population of about 3.52 million, and Montreal is the second-largest, with about 2.96 million.

The NCR spans the Ottawa River and covers an area of approximately 4660 km² (1,800 mi²), with 2720 km² (1,050 mi²) located in Ontario and 1940 km² (750 mi²) in Québec.

Twenty-seven local municipalities and two regional governments constitute the region. Each has land use planning authorities and responsibilities delegated by provincial legislation. The responsibilities include the preparation of official plans and zoning bylaws and the provision of transportation, water supply, and community services.

The regional governments of Ottawa-Carleton and the Outaouais have produced plans that contain objectives and policies for the physical development of their jurisdictions with regard for social, economic, and environmental matters. The regional plans are complemented by plans and zoning bylaws adopted by each area municipality that direct development in accordance with regional and local objectives. The more detailed local plans are required to conform to the regional plans.

The plans and policies of the federal government influence the evolution of the NCR considerably. The federal government is a major landowner and the largest single employer in the capital.

NCC is the federal agency responsible for planning the federal interests in the capital. The federal government is not required to conform to regional or municipal plans and bylaws but maintains close contact with the regional governments as partners to ensure coordinated planning and development.

Parliament established NCC in 1958 as the federal planning agency for the capital. NCC's role includes preparing plans and assisting in development, conservation, and improvement of the NCR in accordance with its significance as the seat of federal government. NCC has a broad range of land use powers to realize this mandate, including planning for the capital, coordinating and approving the development of all federal

lands in the capital, and acquiring lands for new federal buildings and facilities.

RESEARCH ABOUT TELEWORK

A number of methods are being used by NCC to obtain data about the nature and extent of telework, the way telework is applied, and the success of this application. The methods include literature search of Canadian and U.S. journals and publications associated with telework; contacts with a number of organizations in Canada, the United States, and Europe believed to be applying telework or remote work arrangements; and studies of the feasibility of telework and management attitudes toward remote work arrangements.

Canada Mortgage and Housing Corporation has recently embarked on research associated with the impact of information and communications technologies on aspects of urban functioning (Environmental Directorate, Group on Urban Affairs, unpublished material, 1989). This work is part of Canada's principal contribution to a project sponsored by the Organization for Economic Cooperation and Development (OECD) about the urban impacts of technological and socio-demographic change. The purpose of the OECD project is to identify applications of communications and information technologies that improve urban functioning; to assess their effectiveness in terms of quality, equity, and efficiency; and to develop policies that help spread these applications in both the public and private sectors.

Canada's contribution is identifying ways in which local authorities are applying these technologies for improved planning, management, and services. The functional areas dealt with in this project range from economic development, education, culture, environment, integrated planning, and information services to transportation. The OECD plans to establish dialogue with the European Economic Community, United Nations organizations, and other international groups about the issues arising from this project.

The federal Department of Communications in Ottawa is conducting a telework demonstration project whereby an employee works at home 2 to 3 days per week with the remainder of the week spent at the department offices downtown. The project is examining the effectiveness of information and communication support services and hardware. The department has not revealed any plans to evaluate the interactions among communications, transportation, and social aspects.

Examination of contemporary literature suggests that social, organizational, and policy rather than technological issues are constraining the acceptance and implementation of remote work. More empirical work is required to investigate management and employee perceptions about these substantive issues. The study by Stevenson Kellogg Ernst and Whinney (1) for NCC on telework and recent surveys of public-sector managers' attitudes toward telework in the capital region offer preliminary insight.

The Stevenson Kellogg Ernst and Whinney study examined the theory and application of telework. The study investigated possible changes in the nature and location of work in the NCR promoted by communications technology. It also examined potential impacts on the capital. The study essentially examined the probable extent to which telework would con-

tribute to a delocalization of employment from the downtown area. It examined the distribution of federal employment among the principal occupational categories (Table 1), assessed the likely effect of telework on these occupational categories (Table 2), and suggested a likely number of potential federal teleworkers (Table 3).

TABLE 1 DISTRIBUTION OF FEDERAL EMPLOYEES IN THE NCR

	1971		1983	
Executive, Scientific, Professional	6,759	(13%)	13,659	(16%)
Administrative, Foreign Service	11,346	(22%)	23,882	(28%)
Technical	4,650	(9%)	7,678	(9%)
Administrative Support	22,246	(43%)	30,410	(36%)
Operational	6,807	(13%)	8,514	(10%)

TABLE 2 POTENTIAL FOR TELEWORK

Category	Group	None (%)	Some (%)
Management	Sr. Management	75	25
Scientific	Actuarial	75	25
	Agriculture	90	10
	Arch. & Planning	90	10
	Auditing	60	40
	Economics, Stats	60	40
	Law	90	10
	Social Work	70	30
	Veterinary	70	30
Admin. and	Admin Services	50	50
Foreign Serv.	Computer Systems	75	25
	Financial Admin	75	25
	Program Admin	90	10
	Translation	10	90
Technical	Science & Engineering	90	10
	Social Science	50	50
Admin Support	Clerk and Regulatory	90	10
	Data Processing	90	10
	Steno & Typing	60	40

TABLE 3 NUMBER OF EMPLOYEES IN THE NCR LIKELY TO PRACTICE TELEWORK, BY OCCUPATION

Managerial, Scientific, Professional	1,700
Administrative, Foreign Service	2,400
Technical	500
Administrative Support	11,500
Operational	1,700
TOTAL	17,800

Total increases to more than 19,000 employees when applied to the estimated 112,000 federal employees in the Capital Region.

To evaluate the candidacy of federal employment categories for telework, the study authors defined the type of jobs having higher probability for telework as those performed independently and permitting flexible schedules, having measurable deliverables, and requiring information and communication support services that are easily provided at remote work locations. The study authors examined the occupational aggregations and estimated 19,000 of a total 112,000 as the most likely number of federal employees to be affected by telework in the capital (1). This total would probably be influenced by policies and locations of departments.

Telework is increasingly driven by motivational factors such as evolving work force demographics and values, affordable technology, and improved employee morale and performance. Forces of restraint include management's view of the traditional place of work and form of supervision.

In 1988 NCC collaborated with Carleton University, the University of Western Ontario, and York University to study the attitudes of senior federal managers toward telework. The study surveyed 208 senior managers with decision-making responsibility for organizational and personnel costs and benefits of remote work, compared the findings with attitudes toward conventional work arrangements, and raised management issues requiring resolution. The survey was designed to collect the following information:

- The extent to which telework, flexible time, and compressed work week are being implemented;
- The extent to which technologies required for remote work are being applied in the federal departments;
- The extent to which management anticipates application of technologies and work arrangements in 1990;
- Management's perceptions of the costs and benefits of remote work arrangements to employees and the organization;
- Whether, in management's opinion, the different work arrangements will lead to valued or undesirable results for the employee and the organization; and
- Demographic data on the managers, their departments, and their organizations.

Multivariate scaling methods and factor analysis were used to identify the predominant attitudes of the survey respon-

dents. Other techniques, such as linear modeling, were also used to identify issues that influence support for flexible-time and telework arrangements.

The findings suggest that senior managers in the federal public service in the NCR are reasonably receptive to the introduction of alternative work arrangements. The data indicate a cautious approach—most managers would most likely adopt innovative arrangements like telework that have been successful elsewhere (L. E. Duxbury, unpublished material, 1989).

Senior managers support in principle the idea of remote work but do not regard telework as providing any benefits to federal departments and agencies. Absence of employees from a central office during regular work hours makes remote work unattractive to managers. Telework will require new management skills.

Senior managers also appear to disregard benefits of remote work for teleworkers (flexible work schedule, reduced costs associated with work, improved housing choice, higher level of management trust, fewer distractions, less work and commuting stress, higher morale, and better quality of work life and job satisfaction) (2).

The survey results also reflect a bias by federal public service managers against the implementation of telework. Successful telework programs indicate a number of economic benefits for the organization (gain in productivity, decrease in absenteeism, reduced air pollution, higher employee morale, reduced overhead costs, improved employee recruitment, and improved employee performance). Senior federal managers in the NCR report neutral attitudes toward employee loyalty, productivity, and staff turnover and recruitment issues. Neutral attitudes suggest that senior federal managers do not recognize the positive influence of telework. Senior federal managers in the NCR are aware of negative organizational impacts of telework but prefer not to recognize the benefits.

More substantive research associated with organizational, social, and policy issues; specific demonstration projects; and continued dialogue and public awareness of the benefits of telework will effectively eliminate bias and lead to a more forward-looking strategy.

POTENTIAL IMPACTS ON THE NCR

Telework could influence the nature of urban development in the NCR, particularly in the suburban communities. Some of the existing land use and travel patterns in the outlying urban areas will probably change. Telework will also probably have important social, economic, and employment impacts associated with increased access to the job market, reduced transportation costs, more housing choice, less commuting stress, and reduced organizational overhead.

Despite the demonstrated benefits of telework, a number of issues that require attention and action continue to restrain the rate of growth of telework in the NCR.

Perceptions by the Regional Governments

Neither the Regional Municipality of Ottawa-Carleton (RMOC) nor the Communauté Régionale de l'Outaouais (CRO) have

developed corporate policies toward teleworking for their own employees. Regional planners, however, recognize the potential benefits of telework in helping to accomplish planning objectives. RMOC considers the key benefit of telework to be support of altered work schedules, which helps diminish travel demands during peak periods.

Deconcentration of employment and services from downtown Hull is an objective of CRO. Locating the property tax assessment function in outlying communities and developing Gatineau as the growth center in the eastern sector of the Outaouais are features of the planning policy (3). There are no explicit telework policies to help achieve regional development directives, but CRO planning officials appreciate that it can help achieve planning objectives, and they recommend a demonstration project involving the federal government.

Federal Telework Policy

The federal government is not developing corporate policies toward telework in the NCR. The Treasury Board Secretariat has no policies specifically directed at telework or telecommuting. There are, however, policies that deal with alternative work arrangements associated with quality of work life, flexible work hours, variable work week, and part-time employment.

The decision to implement telework and other work arrangements remains at the discretion of individual departments. Guidelines allow managers to refuse such arrangements subject to departmental requirements and also depending on their attitudes and understanding of the costs and benefits. More systematic research and progressive education is required to understand and influence managerial attitudes and decision mechanisms toward telework.

NCC Planning Policy

The Federal Land Use Plan developed by NCC and approved by the federal cabinet in 1988 is directed toward guiding decisions and actions concerning the use of federal lands in the NCR. The plan advocates careful consideration of the influences of telecommunications on transportation, employment, the political role of the capital, the quality of the work environment, and land use. The prominence of an information-based economy and the large federal public service in the capital are factors that can support successful telework activities in the NCR. The plan recommends (a) relocating administrative support and information sectors of federal employment (routine information activities are independent of downtown location and can be dispersed while retaining desired contacts) and (b) taking advantage of opportunities for application of telecommunications and information technology to delocalize employment (4).

The plan envisions a model capital for Canada's contemporary information society that demonstrates the benefits of Canada's technological accomplishments, enhances the role and identity of the capital, and projects the capital as a communications center.

Regional Planning Policy

The RMOC and CRO plans make no direct reference to telework or telecommunications. Several issues and policy directives, however, appear to favor telework application:

- Development of large suburban communities,
- Accessibility and associated financial considerations,
- Interaction between major employment locations and the planned regional transportation system,
- Convenience of goods and services through development of small community focal areas, and
- Energy conservation through reduced numbers and lengths of trips and increased transit service.

Telework is clearly a positive factor in locating employment close to residential areas and in helping reduce the length and requirement of peak-period commuting.

RMOC is endeavoring to achieve an integrated transportation system with emphasis on public transit and measures to alter travel demand during peak periods. Importance is also given by the regional governments to transportation systems that respect the environment (5).

The Ottawa-Carleton and Outaouais sectors of the NCR are presently formulating long-range visions. The Outaouais Transit Commission will conduct a strategic study of long-range transportation requirements taking into account the evolution of demographic, social, economic, infrastructure, and development conditions. The study will deal with future travel requirements for the 2020 planning horizon with emphasis on public transit. The influence of communications technologies on land use patterns and travel habits are not being incorporated in these plans.

The identification and assessment of key issues, opportunities, and priorities in any long-range planning process must take into account the interactions between transportation, land use, and telecommunications. It is essential that planners, in their long-range studies, not necessarily assume today's answers for tomorrow's challenges.

REGIONAL TRANSPORTATION ISSUES

Transportation demand in the Ottawa-Hull metropolitan area has grown substantially during the past 15 to 20 years. Although population growth in the Ottawa-Hull area has been steady (14 percent) between 1976 and 1986, employment has grown more (25.5 percent). In addition, the number of daily trips per person has increased by 21 percent between 1976 and 1986, or 2.3 percent annually. Accompanying this increase has been an increase in average trip length. Simulation of travel demand in the Ottawa-Carleton region suggests that average trip length for the 24-hr period will grow from 8.7 km (5.4 mi) in 1981 to 9.8 km (6.1 mi) in 2001.

More than 5.4 billion vehicle-km of travel occur annually in the Ottawa-Carleton sector of the capital. Total fuel consumption for all vehicles probably exceeded 8 billion L in 1989. An estimated reduction of 10 percent in travel attributed to telework arrangements could result in annual automobile

energy savings of \$31 million (Canadian) in Ottawa-Carleton.

The estimated growth trends indicate that the transportation system and facilities in the NCR will be required to continue to deal with higher and costly demands. Added to this is an estimated 27.3 percent increase in population by the year 2011 and a projected 135 percent increase by the year 2050 (6).

The NCR is expected to grow by 8,900 people annually. Steady growth in automobile and goods movement and associated increases in costs due to traffic congestion are also expected. A recent study of goods movement in Toronto, Ontario, estimated the annual cost of congestion attributable to goods movement to be \$15 billion (Canadian) (7).

NCC continues to direct considerable effort and investment toward and to use federal lands in Outaouais and Ottawa-Carleton for improving regional roadway and transit systems, examining the probability and impacts of future interprovincial bridges, ensuring continued compatibility in interprovincial transit services, and developing and maintaining parkways.

Freeway and regional roadway rights-of-way up to 50 m (165 ft) wide along more than 755 ha (1,865 acres) of a total 3285 ha (8,117 acres) of the public urban corridor lands owned and managed by NCC are being considered by the regional governments for future transportation purposes. Whereas much remains undeveloped, about 1500 ha (3,706 acres), or almost half of the inventory, supports a variety of parkway, recreational, and public open-space uses implemented by NCC. These lands were acquired by NCC as components of a national trust on behalf of all Canadians. The use of federal lands to satisfy regional and community requirements is inconsistent with federal objectives and the NCC mandate.

The level of telework in North America is driven largely by issues associated with escalating costs of downtown office space, excessive traffic congestion, and deterioration in the quality of the air (8). Research into telework in Canada's capital region is also driven by other issues: improvements in organizational and individual productivity and morale in an area with high public service employment; growing technoliteracy; affordability; increased participation of women with children in the labor force; and a desire for sustainable development, healthy cities, and a society that practices conservation.

Environmental issues have assumed a profound urgency in the minds of most Canadians. Environmental preservation and conservation are today recognized as global concerns affecting the future quality and survival of life-sustaining ecosystems. The NCR has historically projected a strong, environmentally healthy image, the result of foresight by NCC and its predecessors. The image is manifested by a diversity of green space, ranging from extensive natural areas like Gati-neau Park to agricultural and forestry areas in the Greenbelt and along river shorelines to highly structured public spaces like the Rideau Canal and urban parks.

Remote work in the form of working at home or from a neighborhood center offers an opportunity to reduce the length and amount of commuting during peak periods. Telework is also a way to avoid or level peak travel demands. Traffic congestion and transportation energy use could be reduced by telework.

NCC and other federal lands in the capital must be recognized for their functions associated with the environment. They represent the expression of Canadian attitudes and values about the environment. Telework offers significant help in accomplishing this objective by reducing dependence on traditional transportation solutions to urban development problems.

MORE RESEARCH REQUIRED

The implementation of telework is progressing in the NCR despite the lack of formal policies to manage these programs or to protect participating employees. Presently 1.8 percent (about 2,000 employees) of the federal public service work force in the NCR practices remote work arrangements full time.

There is significant yet cautious interest in telework in the region, but it remains a concept rather than a reality. Contemporary literature and experimentation in telework both indicate that working at home full time is at present not realistic, but formal part-time work-at-home arrangements are increasingly acceptable to management and unions.

More formal telework in the NCR appears to be probable. The survey of federal senior managers suggests that they are receptive to the concept. One-third of the working population in the NCR is employed by the federal government, a unique condition that favors the application of telework.

Additional work is required to investigate the merits of telework as an effective planning strategy in the future growth of the NCR. Study is required to examine interactions between telecommunications and travel behavior by trip mode and purpose. Telework could affect the cost of commuting to work, reduce traffic congestion, and contribute to transportation energy savings and improved air quality.

NCC will participate in a survey of public-sector employees to examine the relationship between work-family conflict and stress and evaluate pertinent individual and organizational results. Alternative work arrangements will be an important consideration in this proposed survey. The findings of the research should improve the understanding of how changing work environments affect families and organizations. The research is an important step toward the creation of more supportive work environments by organizations, improved management of the family-work interface, and wider acceptance of innovative work arrangements like telework. The survey will be conducted by Carleton University, the University of Western Ontario, and the University of Ottawa beginning in early 1990.

Assessment of the influence of telework on land use and development, economic development, and urban and regional growth is also required. Information is also needed on the choice of residential location associated with telework and the influence of telework on family life and quality of work.

Telework is a politically contentious issue given the wide range of interest groups. There has been active opposition to work-at-home arrangements by organized labor in the United States, and labor groups in Canada have been less than enthusiastic about the issue. More information is required about taxation, labor, liability, contracts, and compensation associated with telework.

NCC has a number of options to consider for future action. These include passive monitoring of other telework research and trends, promoting dialogue about benefits of telework, conducting additional studies, and designing a demonstration telework project in the capital area jointly with pertinent departments and agencies.

Should NCC decide to pursue telework more actively, it would be in a pioneering role in the capital.

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