Abstract: Both theorists and practitioners of public administration continue to debate the extent to which public institutions and organizations are likely to be transformed by the burgeoning adoption of information technology (IT). Among those who believe that there will be a substantial, even a revolutionary, transformation, are scholars who emphasize the concept and impact of "informatization." This article focuses on the implications for public administration of the public sector's increasing reliance on IT. It is argued that IT, like information itself, is a vital resource for achieving organizational objectives. The use of IT by public organizations predisposes them to change in particular ways. As a resource, IT has inherent predispositions (e.g., requiring certain skills and investments) that lead to changes in organizational structures and management (e.g., increased dependence on the private sector). Overcoming obstacles to the potentially powerful impact of these IT predispositions will require both short-term reforms (e.g., improved partnering skills) and longer-term reforms (e.g., changes in organizational culture).

Sommaire: Les théoriciens comme les praticiens de l'administration publique continuent à débattre sur la question de savoir dans quelle mesure les établissements et organismes publics risquent d'être transformés par l'adoption croissante de la Technologie de l'information (TI). Parmi ceux qui croient que l'on va assister à une transformation importante, voire même révolutionnaire, il y a les chercheurs qui soulignent le concept et l'impact de « l'informatisation ». Le présent article se concentre sur les répercussions que la dépendance croissante du secteur public à l'égard de la TI aura sur l'administration publique. On argumente que la TI, tout comme l'information elle-même, est une ressource essentielle pour atteindre les objectifs organisationnels. Le recours à la TI prédispose à des changements particuliers les organismes publics en question. En tant que ressource, la TI comporte des prédispositions inhérentes (p. ex., exigence de certaines compétences et certains investissements) qui conduisent à des changements dans les structures et la gestion.

Kenneth Kernaghan is professor of political science and management, Brock University. Justin Gunraj is a former graduate student, Department of Political Science, Brock University. They would like to thank the Journal's anonymous reviewers for their helpful comments.
Theorists and practitioners of public administration continue to debate the extent to which public institutions and organizations are likely to be transformed by the burgeoning adoption of information technology (IT). Scholars who emphasize the concept and impact of "informatization" are among those who believe that there will be a substantial, even a revolutionary, transformation. Interpreted broadly, this term refers to the process by which "public service organisations – and thus the administrative organisation of the state – are becoming strategically and centrally dependent upon the changing flows of informational resources which are made possible by powerful combinations of information and communication technologies."

This article focuses on the implications for public administration of the public sector’s increasing reliance on IT. It is argued that IT, like information itself, is a vital resource for achieving organizational objectives. The main argument is that the use of IT by public organizations predisposes them to change in particular ways. As a resource, IT has inherent predispositions (e.g., requiring certain skills and investments) that lead to changes in organizational structures and management (e.g., increased dependence on the private sector through partnering and contracting). We begin by examining the concept of informatization. This is followed in the second section by an explanation of the increasing importance of IT as a public-sector resource. The third section examines the impact of IT predispositions on the structure and management of public organizations, and the final section draws out learning points for the practice and study of public administration.

"Informatization"

In North America, there has been little scholarly examination of the concept of "informatization." The concept is closely associated with academic scholarship in Western Europe and, most notably, with the Rotterdam/Tilburg research group on informatization in public administration, which explains the process of informatization as:

- the introduction of information technology to shape or take care of the information retrieval process by means of automated information systems;
- the (re)arrangement of information flows and information relationships to facilitate the administrative or management information process;
- the adjustment or change of the organizational structure in which information technology is introduced;
- the development of information policies as a differentiated area of decision-making in the organization; and
- the introduction of specific expertise in the field of information technology through functionaries or consultants with specific tasks in this field.  

Some academic scholars view informatization as an emerging new paradigm in public administration. John Taylor argues that this perspective enables us to understand better than we ever have the relationships between governments and citizens, political executives and legislators, and political leaders and public servants. He goes so far as to recommend a breaking away from mainstream writings on public administration, since these writings ignore or minimize the fact that information is “the centrepiece” of understanding public administration” and “from that understanding, we can research and understand public administration at a level that has previously been impossible to achieve.”

A. Zuurmond and I.Th.M. Snellen go even further. They contend that “[f]acilitated by [information and communication technologies]-development and attracted by ICT-opportunities, bureaucracies are being replaced by infocracies.” Infocracy is offered as a new ideal-type that is fundamentally different from the traditional Weberian ideal-type bureaucratic structure. This new organizational structure is characterized by
- less hierarchy (because of the disappearance of the middle management layer);
- greater decentralization (because team members are empowered);
- less formalization (in that forms are shorter and approvals are fewer);
- a change in the level of specialization (in that the scope of public servants’ tasks has broadened but the extent to which they are in charge of how their work is done has shrunk); and
- two forms of change in specialization (a new official – the IT expert – has been introduced, and there has been a de-skilling because fewer officials with high vocational training are needed).

While there is substantial agreement among academic authors on informatization that information is the lifeblood of public administration, there is disagreement about the importance of information technology in the informatization process. Christine Bellamy and John Taylor offer a comparatively restrained assessment of the likely impact of the use of ICTs. They assert that “information and its communication cannot ... be corralled into a technologically defined pen, to be pigeonholed, studied and researched under the rubric of IT.” They conclude also, from their application of institutional analysis to information-age governance, that “the institutions of governance will mould and fashion the revolutionary potential of ICTs into an evolutionary reality.”
Similarly, John Hudson's analysis of informatization in the light of some leading theoretical approaches in political science suggests that it will have a much more limited effect than that envisaged by widespread utopian perspectives on the role of IT. His use of the policy networks, rational choice and new institutionalism approaches to examine informatization in three policy sectors of British government led him to conclude that 1) change has been incremental in nature; 2) there were variations among sectors in the extent of informatization; and 3) these variations were significantly influenced by political considerations.8

Information technology is the driving force of the informatization process. The infrastructure provided by increasingly sophisticated and powerful IT is making information more usable and valuable.

This article does not argue that informatization has created a new paradigm of public administration or a new ideal-type of public bureaucracy. It does argue, however, that the current and emerging impact of IT on the public sector has been underestimated, not only by many practitioners but by many public administration scholars as well. Most scholarly publications on public administration in Canada, including the most recent textbooks, have little or nothing to say about the expansion and implications of the use of IT. However, in The New Public Organization, Kenneth Kernaghan, Brian Marson and Sandford Borins emphasize the growing power and pervasiveness of IT in public organizations.9 They conceptualize IT as one of the primary means by which public organizations are moving between the bureaucratic and the post-bureaucratic models of public organization. They argue that IT "is right at the core of public organizations in Canada" and when IT "is introduced into the public sector, it can dramatically affect both internal operations and relations with the public."10 Academic scholars need to take careful account of the impact of IT, not only on the structures and management of government but also on theories of public organization (e.g., Weberian ideal-type bureaucracy, open systems organization theory).

The analysis in this article lends support to those who foresee increasing reliance on IT as bringing about more substantial change in public organizations than that envisaged by many theorists and practitioners of public administration. We argue that the use of IT in public organizations tends to lead to certain kinds of changes in these organizations and that the more extensive the usage the more likely these changes are to occur. However, it is acknowledged that the nature and extent of these changes can be greatly influenced not only by technological forces but by political and other forces
as well. Kernaghan, Marson and Borins acknowledge that IT is only one of several major drivers of public-service reform (e.g., restructuring, partnerships). Moreover, the use of each driver has important political, organizational, managerial and value implications, and there are substantial impediments to the successful application of each driver, including IT.

**Information technology as a resource**

A focus on financial and human resources management continues to dominate general management concerns in the public sector. However, the relative importance of information management (IM) is increasing at an accelerated pace—and managing IT is an integral part of the broad task of IM in general. The elevated importance of IM—and of IT as well—is formally acknowledged in the federal government's 2003 Policy on the Management of Government Information. This policy describes information in the digital age as a valuable asset that the government must manage as a public trust. The policy also requires federal government institutions to "use electronic systems as the preferred means of creating, using and managing information." Information technology will be the central resource in meeting this requirement.

Information and information technology are both becoming increasingly important public-sector resources and they are tightly intertwined. They can be viewed as commodities that are bought and sold in the marketplace, but they can also be viewed, in the organizational context, as resources that are vital to the daily tasks of individuals within the organization and consequently to its overall ability to meet its objectives.

Information is a less tangible resource than most physical goods and consumer commodities and it means different things to different managers. Its many forms include business data, voice conversations, still images, motion pictures, and multimedia presentations. A processing manager might conceive of information in terms of data, a records manager in terms of records and reports, and a senior manager in terms of conversations and written documents. Information technology is a more tangible resource than information; it refers to any equipment or interconnected system of equipment that includes all forms of technology used to create, store, manipulate, manage, move, display, switch, interchange, transmit or receive information in its various forms.

Contemporary IT allows information to be exploited to a far greater degree than older technological and material-based alternatives. This fact underpins the shift from the industrial to the information economy. In the industrial economy, the methods of production are material-based and resource-intensive; they consume considerable amounts of time, labour, capital and physical materials. In the information economy, the methods of production are not centred on "hard" resources but rather on the availability of
information. Production processes consume less time and energy and require a more highly skilled workforce.

Shoshana Zuboff provides an important insight in her distinction between IT and traditional forms of machine technology. She argues that the use of IT permits not only automation but also what she terms “informating.” The same technology that automates operations also informates by “simultaneously generating information about the underlying productive and administrative processes through which an organization accomplishes its work.”¹³ This information can be used for a variety of purposes, including empowering employees, enabling management to exercise greater control over employees, and improving service. Zuboff notes the potential for innovation arising from intended rather than unintended use of the informating power of IT. She notes also that managers have not recognized sufficiently the power of informating and that they could choose at the start of an automation process to exploit this power.¹⁴

Public administration is an information-intensive activity. Indeed, information is an indispensable resource that is both the raw material for, and a product of, virtually all government activities. Such activities as making health or defence policy, collecting taxes, providing social security services and conducting medical research are grounded in information. Moreover, the policy-making, decision-making and communication processes that pervade government’s service, regulatory and research functions rely heavily on information. The transfer of information that occurs in these processes entails information flows between and among all of the many actors in the political system.

The increased use of IT has been accompanied by a steadily growing infrastructure dedicated to developing and managing IT tools, frameworks and policies and acquiring a large number of technologically skilled employees.

These information flows involve the collection, production, dissemination and exchange of information – and IT is the resource that is enabling these flows to take place with increasing ease, rapidity and repercussions. Information technology is the driving force of the informatization process. The infrastructure provided by increasingly sophisticated and powerful IT is making information more usable and valuable. The value of the World Wide Web, for example, lies in its capacity to provide immediate and widespread access to information.

As a resource like IT becomes increasingly preferred and prominent in an
organization — a development that has been formally mandated by the federal government's *Policy on the Management of Government Information* noted above — it influences virtually all aspects of its environment. The extent of this influence on the organization and on the organization's consequent transformation depends to a substantial degree on the nature of the resource itself. Information technology is a resource with certain inherent predispositions. When a public organization uses IT extensively, these predispositions tend to lead to structural and managerial change.

**Information technology predispositions**

A strong argument can be made for three major predispositions:

1. *The use of IT predisposes public organizations to acquire specialized skills and substantial capital investment.* All resources in their barest form require some cultivation to make them usable. However, in its requirements for cultivation, IT differs from natural resources like iron ore or lumber, which require substantial energy and physical labour to turn them into something useful. The development of IT, in public organizations as elsewhere, is expensive and requires highly specialized employees and considerable investment in technological infrastructure. Governments must have substantial human and financial resources to ensure the effective formulation and implementation of IT policy.

2. *The use of IT predisposes public organizations to improve efficiency by streamlining the management of information.* Before the introduction of IT, the management of information resources was tied to paper-based processes that were energy and labour intensive. The use of computing technology significantly increases productivity by greatly enhancing the efficiency of information processing. In the information-rich environment of the public sector, this can lead to substantial cost-savings resulting from the elimination of organizational redundancy, including jobs.

3. *The use of IT predisposes public organizations to share and disseminate information.* Modern communications capabilities allow information to be transferred at close to the speed of light to countless individuals scattered around the globe. In sharp contrast, such material goods as books or pamphlets are more difficult to transport and cannot be disseminated as readily as a piece of information. The availability of personal desktops and other ITs has made communication between organizational members simple and effective, as measured by cost and energy expended. Consequently, the increased deployment of IT allows for greater fluidity of information flows in and across the organizational and institutional setting. This places heavy pressure on decision-makers to communicate and to share information to a much larger extent than in the past.

A key argument in this article is that IT is more than a simple tool, enabler, or facilitator of change. The argument is not, however, a technologically
determinist one. Orthodox technological determinists believe that the use of technologies determines the outcomes – that the technologies are the cause of the change. We argue here that the use of IT tends to lead to certain kinds of changes in organizations and that the impact of the IT predispositions will become increasingly important as IT usage in public organizations becomes more pervasive. It must be recognized, however, that a variety of other factors within public organizations, including political, structural, managerial and cultural factors, shape significantly the use and impact of IT.

Each of the three propositions set out above is examined in detail below. While the predispositions often reinforce one another in their influence on organizational and managerial change, for the sake of analytical clarity, each predisposition is discussed as a separate proposition.

**Seeking skills and finding funds**

*The use of IT predisposes public organizations to acquire specialized skills and substantial capital investment.* Meeting the financial and human resource requirements arising from the adoption of IT has become an increasingly significant challenge for governments. Departments and agencies have to compete within their own government for public funds to support IT investment and with the private sector for technologically skilled employees.

The use of IT in the federal public service progressed from a relatively modest emphasis on the automation of clerical functions in the mid- to late 1980s to a major effort in the 1990s to reform service delivery and internal administration. This greatly increased enthusiasm for IT was based on growing recognition that IT could transform radically the way government conducts its business. Between 1986 and 1992, the federal government's investment in IT grew at an average of over eight per cent annually to a total of more than $2 billion. During this same period, $11 billion was spent obtaining IT goods and services from the private sector. By 1993, the IT community in the federal government consisted of about 20,000 employees, with total salaries of about $1 billion. These employees were responsible for installing, managing and maintaining more than 200,000 workstations, over 500 mainframe and mini-frame computers, many different computer-based financial and administrative systems, and hundreds of IT projects.

The robust spending on IT goods in the federal government during the 1980s and early 1990s reflected a shift from the use of centralized computer systems to personal desktops and, to a lesser extent, the automation of service-delivery functions. The office automation trend gradually began to extend to service-delivery points. For example, in 1992 the Department of Employment and Immigration created centrally located automated job information centres (JIC), enabling individuals to search for job vacancies on-line, instead of having to rely on job posting boards at employment centres. At the end of 1993, IT was being applied across 1,200 different federal
programs and services.\(^{19}\) If at that time all federal IT activities had been amalgamated into a single department, it would have had the fourth largest budget in the government behind Finance, Human Resources Development and National Defence.\(^{20}\)

Since that time, federal government spending on IT goods and services has increased considerably. According to a "conservative" estimate by the auditor general, annual IT expenditures rose almost fourteen per cent – from about $3 billion in 1995–96 to $3.4 billion in 1998–99 – and spending on IT as a proportion of the federal government's overall budgetary expenditures rose from 8.6 per cent to 10.1 per cent.\(^{21}\) As early as 2000, one estimate put the true annual IT expenditure in the federal government at approximately $5 billion.\(^{22}\) Federal investments in IT have ranged from the purchase of small volumes of low-cost goods to large purchases for extensive multiyear projects that often involve services from different levels of government and suppliers from the non-governmental sector of the economy.

By contracting-out IT services to the private sector, governments can reduce their need to attract, train and retain well-paid IT workers. Similarly, public-private partnerships can help governments obtain expertise and capital funds for innovative IT projects that would otherwise be poorly resourced or never pursued.

The increased use of IT has been accompanied by a steadily growing infrastructure dedicated to developing and managing IT tools, frameworks and policies and acquiring a large number of technologically skilled employees. A central feature of the expanded infrastructure is the office of the chief information officer (CIO). The precursor of the CIO was the office of the chief informatics officer, which was created within the Treasury Board Secretariat in 1993, strengthened in 1994, and then replaced by the office of the CIO in 1996. The CIO, who holds the rank of assistant deputy minister and heads a separate branch of the TBS, is responsible for "providing leadership, coordination and broad direction in the use of IT; facilitating enterprise-wide solutions to horizontal IT issues; and serving as technology strategist and expert advisor to Treasury Board Ministers and senior officials across government."\(^{23}\)

These developments reflect the growing need for a pool of skills and funds to develop and manage IT. For example, Government On-Line (GOL) – originally an initiative and a division within the Chief Information Officer Branch (CIOB)\(^{24}\) – was given responsibility for allocating $880 million to government departments over six years (2000–05) for the three major purposes
of 1) ensuring that the most frequently used services are made available online; 2) creating web sites that provide one-stop access to government services; and 3) developing the policies and infrastructure needed to protect the safety and security of the user.

The increased use of IT requires major investment not only in financial resources but in human resources as well. A competent IT workforce is critical to government's efforts to develop and implement IT policies successfully. The role of IT professionals is evolving from a support service to a strategic resource, as IT professionals are increasingly expected to complement their skills in implementing IT policies with managerial, communication and problem-solving skills. In addition, IT executives (i.e., chief information officers and IT heads within departments) are becoming an important component of senior management.

Governments are in keen competition with the private sector for knowledge workers in general and IT executives and professionals in particular. In recent years, the dot.com bust has made more IT workers available to government, but the task of recruiting and retaining them, especially at senior levels, remains a difficult one requiring special incentives, including higher salaries. The CIOB developed a human resources framework for information management and information technology to help train and retain IT professionals and executives. One of the carrots that government offers current and prospective IT workers is the unparalleled "challenge and scope of IM/IT work in government. ... Government is tackling IT projects on a range and scale that is difficult to match anywhere, and in many areas it is charting new territory."26

The scarcity of human and financial resources in the IT sphere has obliged governments to rely substantially on the private sector for specialized skills and capital investment through the use of contracting-out and public-private partnerships.27 John Langford and Yvonne Harrison note the widely accepted view that "go-it-alone ICT/e-government strategies are costly and have not achieved the desired levels of performance or transformation desired by governments. Governments are seen to lack IT competence, to have difficulty 'keeping up' on their own with the changing new economy, and to lack incentives to innovate."28 By contracting-out IT services to the private sector, governments can reduce their need to attract, train and retain well-paid IT workers. Similarly, public-private partnerships can help governments obtain expertise and capital funds for innovative IT projects that would otherwise be poorly resourced or never pursued. The scarcity of resources can stifle innovation by discouraging public servants from undertaking imaginative, but expensive, IT initiatives. It must be recognized, however, that the use of public-private partnerships has become increasingly controversial and that some of these partnerships, especially for large IT initiatives in government, have been costly failures.29

Many federal departments and agencies have turned to the private sector
for help in the design and delivery of their on-line services. Michelle
d’Auray, formerly Canada’s chief information officer, has noted that “[a]
body of practical knowledge and experience exists in the private sector as
does the technological and information expertise. ... Furthermore, the pri-
ivate sector has access to financing to augment what government is able to
provide by way of new investment dollars.” For large IT projects, govern-
ments in Canada and elsewhere are utilizing variations on the common ser-
vice procurement approach. This approach, among other things, authorizes
departments to find private-sector partners to supply skills and funding and
to share in the projects’ risks and benefits.

A notable IT public-private partnership is Atlantic Canada On-line – an
electronic information service that enables clients to receive a wide array of
services. The four Atlantic provinces signed a seven-year partnership agree-
ment with Unisys Canada, which was given a licence to access provincial
government databases and provide service to clients (e.g., personal property
registration). The governments retain ownership of the information and
control of public policy issues, while Unisys is responsible for building and
operating the service. Unisys is investing the full $10 million needed to
develop, implement and manage the initiative in return for a share of the
revenues generated from transaction fees paid by clients.

Another provincial example is the ServiceOntario self-serve kiosks, which
involve a partnership agreement between IBM Canada and four Ontario
ministries to provide information services (e.g., licence-plate renewals) to
citizens through a network of electronic kiosks. The project was developed
without any provincial funding. All the technology and other capital assets
needed to build the network were pioneered and provided by IBM. Under
the agreement, IBM has an ongoing responsibility for the maintenance of the
kiosks. In return, it is compensated for each kiosk transaction, with the
amount of the commission diminishing over the life of the contract.

Since departments and agencies have to fund IT projects in large part from
their own budgets, the need to secure alternative sources of capital will con-
tinue to drive them towards out-sourcing and partnerships. The develop-
ment of large-scale innovative projects will also reinforce the need for
private-sector participation because host departments and agencies will
require cutting-edge technology and skills that can only be provided by
technology firms. As we have seen with arrangements such as Service-Ontario, governments will also solicit assistance from the private sector in operating and maintaining the technology over the life of the arrangement.

An excellent emerging case of the influence of increased IT usage on the need to acquire skills and investment is the creation of Canada Health Info-way, a non-profit corporation that, among other objectives, aims to enable fifty per cent of Canadians to have electronic access to their patient record by 2009. The corporation has recognized the need to train physicians so that they can manage information and IT. And the federal government has already committed over $1 billion to the corporation that will leverage its investment through partnerships with both the public and private sectors. The potential commitment of governments to IT in the health sector can also be illustrated by the US$11 billion IT project that is under way in England's National Health Service. This project aims to create a national system of patient records by 2010. The Economist notes that the government’s poor record for large IT initiatives has led to reliance on private-sector suppliers to provide input and access to the national health records database.

Improving efficiency

The use of IT predisposes public organizations to improve efficiency by streamlining the management of information. Computing technology has become a major tool for effective information management, defined as “the means by which an organization efficiently plans, collects, organizes, uses, controls, disseminates and disposes of its information, and through which it ensures that the value of that information is identified and exploited to the fullest extent.” Applying IT to the management of information can bring substantial efficiency gains. Jane Fountain claims that “[m]ovement from paper-based to web-based processing of documents and payments typically generates administrative cost savings of roughly 50 percent – more for highly complex transactions,” plus “additional savings of money, time travel, and efforts to citizens and intermediate institutions.”

Efficiency gains became increasingly evident over the period from the development of mainframe computing to the current use of advanced computing technology. In the 1950s and 1960s, the adoption of mainframe computing to carry out clerical and administrative functions led to increased productivity while reducing jobs and expenditures. Computer-based systems of information handling can perform many government functions more quickly and more inexpensively while using fewer human resources. For example, sending a forty-two-page document via e-mail from Ottawa to Tokyo is 720 times faster and 355 times cheaper than overnight delivery.

While IT is usually expensive to acquire, its ability to produce and reproduce information goods inexpensively can bring a sizable return on investment. The production of information goods involves high fixed costs but
low marginal costs.\textsuperscript{39} The cost of information processing has decreased enormously over the past twenty years and is expected to continue to decline. Current estimates show that cost-performance ratios are declining at a rate of twenty to thirty per cent a year.\textsuperscript{40} The savings resulting from IT-enabled improvements in IM can help to offset the labour and capital costs arising from the use of IT that were discussed in the previous section.

\begin{quote}
While the use of IT predisposes public organizations to share and disseminate information, there are, as suggested earlier, substantial obstacles to realizing IT's full potential
\end{quote}

If the federal government follows through on its commitment to manage information as a public trust and to do this largely through the use of ICTs, significant cost-savings and a related reduction in employment levels should result. The more that IT is strategically managed on an enterprise-wide basis, the more likely it is that cost-savings will be achieved. However, for many IT projects, hard evidence on efficiency gains\textsuperscript{41} and employment reductions resulting from increased use of IT is unavailable. Much more common than solid evaluation studies are claims and projections, especially by politicians, of substantial savings and reductions. For example, to effect savings by streamlining government processes and redistributing staff, federal politicians and senior public servants have called for the creation of "shared services organizations" (ssos), along the lines of those already established in Alberta, British Columbia and Ontario, to allow information resources to be centrally managed across the entire government. This shared service approach would bring together the internal services usually provided separately by each department, thereby allowing departments to concentrate on program delivery rather than on administrative requirements. If all federal departments adopted the sso model, the projected savings would amount to more than $2.5 billion over ten years.\textsuperscript{42} The Department of Public Works and Government Services would be responsible for implementing the sso model, but even the CEO of the department's Information Technology Services Branch has noted that implementing the model would involve "a fairly major transformational change in government, in terms of how people do business. It [would] mean a fairly major cultural change in terms of trusting someone or some organization or some entity with things that are particularly important to you – to doing your business."\textsuperscript{43}

The scale of claimed efficiency benefits can differ considerably. For example, the government of British Columbia announced efficiency gains arising from a reduction of thirty-five clerical positions because of automation in its
Corporate Registry. On a much grander scale, Britain's chancellor of the exchequer, Gordon Brown, announced in 2004 that the government's investment of £6 billion in new IT would permit it to cut the number of civil servants by 84,000 by 2008, while at the same time delivering more efficient public services. The OECD has warned that its member states "have difficulty monitoring and evaluating e-government (including costs, benefits, and level of demand), yet increased support for e-government projects will depend on these measures."46

Sharing and disseminating information

The use of IT predisposes public organizations to share and disseminate information. The concept of "informating," discussed earlier, indicates that IT usage not only promotes efficiencies by improving productive and administrative processes but also generates new information that can be widely shared or integrated. For example, information held in databanks in different parts of a government can be cross-matched or integrated to produce valuable new information for policy-making and program delivery – and, subject to privacy considerations, this new information can in turn be shared across government.

Most public-sector activity relies heavily on the dissemination of information, and most of the processing and communication of this information is accomplished by digital means. Computers, networks, the Internet, fax machines, e-mail and similar ITs have had an enormous impact on the performance of public organizations. Information technology has dramatically reduced the historical barriers to disseminating and sharing information. By spreading information with remarkable speed, IT is dramatically reducing time and distance barriers. Stand-alone computers, as the name implies, are largely self-contained, with no real communications component. By comparison, computers that are networked act as a system that enables the information to be widely disseminated among users.

The spread of IT resources in the public sector has been associated with a sharp increase in the level of intra-organizational and inter-organizational communication. The high rate of Internet penetration in government has been accompanied by public servants' extensive and routine use of e-mail. Each day about six million e-mail messages are exchanged within the federal government. Information can also be spread quickly through a government's Intranet, which provides employees with a direct and streamlined mode of interaction with other employees across the government. In addition, Intranet-enabled training can reach a large number of staff in a short amount of time and the Intranet is useful for informing staff of the latest news or issues, serving as a platform for the publication of internal documents and even facilitating teleconferences. Computing technology has also enhanced management information systems that now provide decision-
makers with much more information and on a real-time basis. Information technology enables public servants to interact more easily and more frequently and thereby encourages a high degree of information-sharing.

The use of IT also encourages the dissemination of information across organizations—and across governments and sectors as well. The availability of information made possible by computing technology and the development of government-wide IT infrastructure promotes the sharing of information across departmental boundaries and a consequent reduction in overlap and duplication of internal administrative and service-delivery functions. For example, the electronic directory service launched by the federal government in 1996 to provide government-wide directory information on public servants (e.g., name, telephone number) has produced substantial cost-savings through paper reduction.

The increased sharing and diffusion of information across governments and sectors can be effectively demonstrated by reference to the remarkable growth of integrated service delivery (ISD). These arrangements bring together government services so that citizens can meet their wants and needs seamlessly. Integrated delivery provides single-window service (one-stop access to services), largely through collaboration across governmental and sectoral boundaries. These collaborative arrangements are driven not only by IT-enabled sharing and dissemination of information but also by governments' needs, discussed earlier, to obtain specialized skills and substantial capital investment through public-private partnerships. Collaboration can involve a large number and variety of participants. For example, the Canadian Consumer Information Gateway joins up more than 400 partners, drawn from departments and agencies in the federal, provincial and territorial governments and from non-governmental organizations. Partner organizations are able to maintain their own information on the main portal by remotely disseminating their collections to the central databases. This ensures the currency of information and provides more functional value than if partners were simply to post links from their existing home pages.

The use of IT has enabled ISD arrangements to take a wide variety of organizational forms, thereby supporting the view of those who contend that informatization adjusts or changes the organizational structure in which IT is introduced. These new arrangements include ISD units within departments (e.g., as in British Columbia, Ontario); corporate service utilities that take the form of a public corporation, with a board of directors reporting to a departmental minister (e.g., Service New Brunswick); NGO service utilities, which involve a non-profit organization with governmental and private sector partners (e.g., Victoria Connects); and organizations providing service delivery through integration (e.g., the Canada/Manitoba Business Service Centre, which has thirty-six federal, twelve provincial and eight non-governmental partners).
Barriers to sharing and disseminating information

While the use of IT predisposes public organizations to share and disseminate information, there are, as suggested earlier, substantial obstacles to realizing IT's full potential. Moreover, the extent and impact of the obstacles will differ from one government, one government department, and one policy sphere to another. The scope and nature of these obstacles are illustrated here by reference to the challenge of using IT to promote ISD across departments and governments.

Among the political obstacles to ISD in Canada's federal and provincial governments is the fact that the individual responsibility of ministers for the conduct of their departments encourages them to focus on the vertical dimension of government. The horizontal perspective that is needed to foster ISD through the Internet channel is relatively neglected. Structural obstacles include the related problem of "departmentalism." The traditional "silo" design of departments runs strongly counter to the current emphasis on horizontal government: "Governance structures favour departmental projects, not interdepartmental partnerships."49

Legal obstacles to ISD include legislative and regulatory barriers that require political consent for their removal or modification. Some of these obstacles are more evident than others. It is clear, for instance, that privacy acts restrict the sharing of some kinds of data between government and business partners. Less obvious is a situation like that involving employees of Canada Customs and Revenue Agency (CCRA), who have immunity in respect to giving tax advice - an immunity that does not extend to ISD partners who may act on the agency's behalf.

A major operational obstacle is the lack of inter-operability, in the sense of differences across departments and governments in laws, policies, rules, regulations and standards. Multiple accountabilities have to be sorted out; different human resource policies, including salary levels, have to be accepted or accommodated; different unions representing staff from different jurisdictions have to be satisfied; and financial rules have to be harmonized.

Among the managerial obstacles to effective ISD is the lack of resources arising from the reluctance or inability of governments to fund projects on a horizontal basis. Integrated service-delivery projects are often multiyear initiatives that require substantial up-front investment and take considerable time before savings can be harvested. Changing a department's or a government's budgetary system to permit dedicated funding of horizontal projects can be extremely difficult.

Finally, cultural obstacles can inhibit the blending of organizational cultures required by many ISD arrangements that extend across departments, governments and sectors. Long experience working in silos under strict accountability requirements creates a culture of tunnel vision rather than the peripheral vision needed for horizontal government. This tunnel vision is
often accompanied by turf tension, as individuals and organizations strive to protect established mandates and processes, in part by restricting the sharing of information.

A major impediment to the sharing and dissemination of information that cuts across several of these categories of barriers is concern about the infringement of individual privacy. The many aspects of this large issue cannot be examined here, but special note should be taken of the continuing tension between protecting citizens' privacy and using IT to facilitate transparent and efficient government. E-government leaders are devoting substantial resources to reducing this tension; however, a substantial number of citizens are still reluctant to provide information and conduct transactions on-line that may jeopardize their privacy.

Implications for middle management

This third predisposition, involving the sharing and dissemination of information, is closely related to the second predisposition, in that it promotes the streamlining of IM and can, thereby, foster organizational efficiencies. In particular, the two predispositions can reinforce one another to foster a reduction in the ranks of middle management. Extending the lines of communication to allow senior management to send and receive information to and from lower levels of the hierarchy can reduce the need for middle management. A de-layering of the middle levels of the hierarchy, which promotes cost-savings, can flatten the organizational structure. However, the extent to which IT contributes to a reduction in middle management is a matter of debate. Alain Pinsonneault and Kenneth Kraemer reviewed the empirical work on this subject to 1990 and conducted their own empirical study in 1997. They concluded that if both computing and organizational decisions are centralized, top managers tend to use IT to reduce the number of middle managers, but if these decisions are decentralized, middle managers use IT to increase their numbers. Sandford Borins and David Wolf assert that since 1990 the use of IT has resulted in more substantial reductions in the number of middle managers than before that time.

With particular reference to the public sector, John Taylor argues that "[t]he capability to transmit information directly from operational to strategic levels of the organization means that fewer 'booster managers' are required in the middle tiers of the organization than before information networks were installed." And Borins and Wolf note that in a period of government downsizing "we could expect that [pressure to reduce the number of staff] would result in a reduction of the ranks of middle management in all departments, but that in the more operational departments, where information roles can be replaced by IT, this reduction would be the greatest." In support of this hypothesis, they cite the findings of the 1996 U.S. National Performance Review that surveyed changes in the number of supervisors
and management positions across government. The survey found that departments with the smallest percentage of reductions in middle managers were "central agencies" (e.g., Justice, the Treasury), whereas those with the largest percentage of reductions were operational departments (e.g., Agriculture, Defense). Thus, the increased adoption of IT can be expected to contribute to flatter organizational structures, especially in operating departments, by encouraging the de-layering of the middle-management ranks.

**Implications and conclusions**

The changes in the structures and processes of public organizations that are influenced by the three IT predispositions are closely related to the major features of informatization set out at the beginning of this article. Especially notable is the impact of the predispositions in respect to

1. the adjustment or change of the organizational structure in which information technology is introduced (e.g., integrated structures for service delivery, the reduction of middle-management positions);
2. the development of information policies as a differentiated area of decision-making in the organization (e.g., the creation of chief information offices in many governments, new policies on the management of government information); and
3. the introduction of specific expertise in the field of information technology through functionaries or consultants with specific tasks in this field (e.g., reliance on private-sector skills, the use of public-private partnerships).

The three IT predispositions also influence the movement of public organizations between the bureaucratic and post-bureaucratic models of public organization. Especially notable is their impact on the movement

1. from independent action to collective action. The need for special skills and capital investment and the pressure to share and disseminate information reinforce the movement of departments and agencies towards collaborative arrangements, including public-private partnerships and various forms of ISD.
2. from the departmental form of organization to non-departmental forms. Again, the need for expertise and investment combined with the capacity to share and disseminate information is prompting the creation of non-departmental forms of organization, particularly ISD arrangements such as service utilities.
3. from hierarchy and central control to decentralization of authority and control. The displacement of middle managers helps to flatten the hierarchy, and the sharing and diffusion of information fosters decentralization of
authority and control through collaborative arrangements between departments, governments and sectors. However, IT can also have centralizing effects in at least two significant ways that move public organizations towards the traditional bureaucratic model of central control and coordination. First, as Fountain argues, compared to the traditional Weberian emphasis on rules and procedures, contemporary information-based organizations can be just as strongly, or even more strongly, rule-based and rationalized: "[R]ules embedded within information systems become less visible and seemingly less constraining to bureaucratic discretion. Embedded rules will increasingly replace overt supervisory control." Moreover, Ignace Snellen notes that the increased use of "textblocks"—prefabricated justifications of decisions—is tending to narrow the discretion of street-level bureaucrats. The use of textblocks involves public servants entering the facts of the case into the information system, which then suggests not only the decision but also the reasons for it. He associates this development with the movement towards "infocracy," explained earlier in this article.

The use of IT has centralizing effects in a second respect. The pressure to coordinate or integrate service policy and delivery, and thus to ensure the inter-operability of computer systems, adequate IT expertise and compatible rules and standards, argues for centralization of IT authority and resources, both within departments and across government. This pressure runs against the current trend towards devolution of authority and control from central agencies to departments and within departments themselves.

We have examined three propositions concerning the implications of IT for public organizations in Canada. This examination supports the argument that the process of informatization is having a substantial impact on these organizations, in that they "are becoming strategically and centrally dependent upon the changing flows of informational resources which are made possible by powerful combinations of information and communication technologies." We have argued that the use of IT by public organizations predisposes them to change in particular ways. However, account has been taken of the "dark side" of these changes in the form of such factors as inadequate evaluation of claimed efficiency gains, undue reliance on the private sector for specialized skills and capital investment, and major privacy issues. Political, cultural and other obstacles to public-sector reforms involving IT have also been identified and illustrated.

Dealing with constraints on the advance of informatization will require both short-term reforms (e.g., improved partnering skills, innovative approaches to ISD) and longer-term reforms (e.g., changes in privacy legislation, changes in organizational culture). The OECD, in its checklist for successful e-government, invites e-government leaders to ask whether there has
been a review of barriers to e-government implementation and whether e-government has been integrated into broader policy and service-delivery goals, into public management reform goals and processes, and into broader information society activity. Canada’s politicians, public servants and academic scholars need to collaborate in answering these questions so that it can be effectively integrated into the practice and study of public administration.

Notes
6 Bellamy and Taylor, “Informatization and new public management,” Public Policy and Administration, p. 29.
10 Ibid., p. 229.
14 Ibid., p. 11.
16 Ibid., p. 28.

18 Ibid.

19 Canada, Treasury Board Secretariat, Powering Up, pp. 10-11.


24 As part of the December 2003 government restructuring under new Prime Minister Paul Martin, GOL was moved to the Department of Public Works and Government Services.


27 A public-private partnership is defined here as “a cooperative venture between the public and private sectors, built on the expertise of each partner, which develops or improves facilities and/or services needed by the public through the appropriate allocation of resources, risks, rewards and responsibilities.” The Canadian Council for Public-Private Partnerships, “The Canadian Council for Public Private Partnerships Announces its 4th Annual National Awards” [news release at http://www.pppcouncil.ca, 2001].


32 Ibid.


41 For several examples of efficiency gains, see Kernaghan, Marson and Borins, *The New Public Organization*, pp. 235-36.
42 d'Auray et al., "From ideas to action," *Policy, Politics and Governance*, p. 4.
53 Borins and Wolf, "Realizing the Potential of Public Sector Information Technology," in [Thomas, d’Ombraim, Borins and Wolf], *Change, Governance and Public Management*, p. 182.
54 See Kernaghan, Marson and Borins, *The New Public Organization*, p. 3.
57 For a lengthy discussion of these issues, see Borins and Wolf, "Realizing the Potential of Public Sector Information Technology," in [Thomas, d’Ombraim, Borins and Wolf], *Change, Governance and Public Management*, pp. 189-206 and 224-37.
58 Bellamy and Taylor, "Informatization and new public management," *Public Policy and Administration*, p. 29.