Treasury Board of Canada Secretariat
Secrétariat du Conseil du Trésor du Canada

Canada

Information Management - Guidelines

Published: Jan 05, 1996

Published by Treasury Board of Canada, Secretariat
90 Elgin, Ottawa, Ontario, K1A 0R5, Canada

Catalogue Number: BT48-8/1996E-PDF
ISBN: 978-0-660-09833-3

This document is available on the Government of Canada website, Canada.ca

This document is available in alternative formats upon request.

Aussi offert en français sous le titre : Gestion de l'information - lignes directrices

Information Management - Guidelines

1. Definitions

Information technology (*Technologies de l'information*)

refers to the scientific, technological and engineering disciplines and to the management technologies used in information handling, communication and processing; their applications; and associated software and equipment, together with their interaction with humans and machines.

Although the above definition includes all information technology resources, the application of specific aspects of the policy may be restricted in some cases and will be the subject of bilateral agreements between the Treasury Board Secretariat and institutions concerned. In the case of the Information Management Plan, the annual instructions delineate the specific items to be included.

The following terms are defined in the Treasury Board Project Management policy: *project, preliminary project approval, and effective project approval*.

Information technology project (*Projet de technologies de l'information*)
refers to the aggregate package of activities leading to the implementation of an information technology application. This includes the design, development and acquisition of software, including all implementation aspects (e.g. documentation, training, testing, and installation), as well as the acquisition of hardware. This definition also applies to replacements of, and enhancements to, existing applications and to information technology components of larger projects that are not principally information technology projects.

Existing automated system (*Système automatisé existant*)
refers to an automated facility, service, or system that has been in full operation for at least three years.

Comparable value (*Valeur comparable*)
means that the estimated annual cost of the operation of the new system is no greater than double the annual operating cost of the existing automated system.

2. Information management planning

2.1 General

The Strategic Direction for Information Management in Chapter 1-1 describes the evolution that is occurring with respect to information management planning. Beginning with long-term plans for information technology, this planning has placed increasing emphasis on information holdings. This and converging technologies have led to greater coordination of the planning for all information-based resources. This section provides a brief overview of the strategic planning process in the government. Institutions should employ the business-case approach (see section 3) as a methodology to carry out this strategic planning.

Each institution should develop its Information Management Plan to meet its particular requirements and circumstances. Figure 1 has been included to show a typical example of an information management planning framework that could be adopted by an institution.

The institution should first set objectives based on its mission and operational plans. Once this is done, strategies describing how these objectives can be achieved should be developed. To be most effective, these strategies should be in such terms that they will remain valid for up to five years. This phase should only need to be performed every three to five years.

The Information Management Plan is a multi-year plan that is normally updated annually. The plan outlines the goals, actions, priorities, resources, policies, standards, and procedures that are required to achieve the objectives. It can be thought of as a prioritized action plan in terms of a moving three- to five-year window. The last event is the production of specific performance targets, tasks, schedules and resource requirements for the upcoming year.

Text version: Figure 1: A typical information management planning framework

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Figure 1: A typical information management planning framework

The effectiveness of the institution's strategies and plans can be increased by considering other factors such as: any overall government directions and objectives as stated in "Enhancing Services Through the Innovative Use of Information and Technology" (see Chapter 1-2); the strategies and plans of the common-service organizations; human resource management processes including training, classification, affirmative action and official languages; applicable security requirements; compliance with approved government information technology standards; and relevant items specifically agreed to by the institution and the Treasury Board Secretariat.

2.2 Government-wide coordination of information management planning

To obtain full benefits, institutions and common-service organizations should plan for information technology, and information management as it is implemented, within a wider framework that includes other institutions and common-service organizations. This is because an appropriate degree of government-wide compatibility is necessary for organizations with different equipment and software to exchange information and to obtain economies from sharing facilities. This requires institutions and common-service organizations to cooperate and accept the necessity to coordinate and standardize certain aspects of their information-based resources. This coordination will be achieved by continuing the government-wide consensus approach; i.e. all parties participate in reaching a solution that balances the degree of government-wide standardization against institution-specific needs, thus optimizing overall benefits.

The coordination of plans for information technology has evolved over time and can be expected to evolve to other information-based resources. It will continue to adapt to changing circumstances. The following paragraphs describe the activities involved in achieving government-wide coordination.

The Treasury Board Secretariat issues a statement of priorities and government-wide issues in information management (e.g. "Enhancing Services Through the Innovative Use of Information and Technology" - see Chapter 1-2). This statement is developed with the advice and assistance of institutions working primarily through the Advisory Committee on Information Management. Institutions and common-service organizations should consider this statement in their planning.

The Treasury Board Secretariat ensures that common-service organizations coordinate their long-term strategies, develop a cohesive direction on government information management issues, and adopt a shared foundation for long-range planning. Institutions are advised about the plans of the common-service organizations so that they can take them into consideration in planning for their future needs.

Although their strategies and plans are primarily for their own use, once institutions approve them, copies are provided to the Treasury Board Secretariat so that their contents can be shared with other institutions and common-service organizations.

Figure 2 illustrates the interactions that take place among the Treasury Board Secretariat, institutions and common-service organizations to coordinate government-wide information management.

Text version: Figure 2: Interactions that take place to achieve coordinated government-wide information management planning

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Figure 2: Interactions that take place to achieve coordinated government-wide information management planning

2.3 Benefits expected from government-wide coordination of information management plans

The coordination of information management planning government-wide results in benefits for all parties involved-institutions, central agencies and common-service organizations.

Some of the benefits that accrue are:

- information management plans are linked to the institution's corporate and operational planning processes and to overall government directions;
- information management investments are directly related to the institution's program results;
- an assessment is made of the technology infrastructure; and
- the new investment is distinguished from the cost of maintaining the operating "plant."

Central agencies and common-service organizations use government-wide information management planning to:

- develop overall government directions;
- provide an overview and assessment of government-wide activity and trends;
- focus on information management as an essential element of program delivery;
- obtain the information needed to be able to coordinate common-service organizations;
- produce government-wide information necessary to support policy development and monitoring;
- provide institutional and aggregate data allowing responses to be given to concerns of the information technology industry, to parliamentary questions and queries from the public; and
- provide a focus on selected "special interest" targets within government information technology.

A major objective of the strategic planning process in institutions is to involve senior and program managers in setting the objectives and strategies and making the plans for information technology in their institution. In the process, a concerted effort should be made to avoid technical language.

3. Business-case approach

3.1 Introduction

Institutions invest in information technology to increase their productivity, to reduce operating costs and to improve their service. Because they have limited investment capacity, institutions want to be certain that they are making the right investment

choices.

The *business-case approach* is a framework for making these decisions. It is based on the principles that a direct relationship exists between every investment made by the institution and its programs or "business" and that each investment should clearly demonstrate benefits to the institution or the government as a whole.

This process for selecting and approving investments allows senior managers to determine the value of investments by understanding their impact on program performance. Fundamental to this approach, therefore, is the premise that information technology proposals are treated as investments rather than expenditures.

Adopting a business-case approach as their strategic planning process for information technology provides senior and program managers with the following benefits:

- information technology management understands the institution's priorities
- program management understands the existing and potential contribution of information technology to improved program performance and enhanced service;
- senior management can determine the optimum level of investment in information technology, and can select and approve specific information technology investments with confidence;
- performance and service improvements can be projected, monitored and realized; and
- the extent to which the institution complies with government information management policies and standards is known.

No particular methodology for the business-case approach is prescribed; institutions decide for themselves how they implement it. However, institutions are required to use a business-case approach for selecting and approving information technology investments. Using a business-case approach is a key part of the institution's processes for developing its Information Management Plan (see section 2), Multi-Year Operating Plan and Long-Term Capital Plan, and implementing the Treasury Board's Project Management and Project Approval policies. Investments proposed by government institutions should also relate to government-wide strategic directions (see Enhancing services through the innovative use of information and technology in Chapter 1-2).

Senior and program managers of the institution have to be involved if the business-case approach is to be implemented successfully. This will only happen if it is conducted with a firm resolve to minimize technical terminology and detail. Other factors critical to its success are:

- the institution must have clear, well-articulated corporate objectives and principles;
- there must be active involvement and participation across the whole institution;
- a strong sense of partnership must exist between the program and information technology organizations, e.g. the information technology mission should have a definite program-support focus and should be expressed in business terms;
- investments must demonstrate a sound business justification including: support of the institution's (and the government's) objectives and priorities, opportunities offered, benefits, results, cost, and risk; and
- the institutions must manage the benefits from investments to ensure that they are quantified and captured.

3.2 A business-case model for investment decisions

The following outline of a business-case approach describes a conceptual process for assessing the current and potential contribution of information technology to the institution; for developing information technology strategies and plans; for establishing the appropriate level of investment in information technology over the planning period; and, finally, for approving specific investment projects.

3.2.1 Establish investment priorities

First, the business direction and strategies of the institution should be clearly understood. Why is it in business? What factors, programs and activities are most critical to its success? The activities of the institution should be reviewed and rated according to their contribution to the key objectives of the institution.

The adequacy of the existing information technology support should be assessed for each activity. In addition, the overall user satisfaction with their existing information technology support should be measured. These provide the basis from which the optimum levels of information technology support can be determined for each program and function.

The implications of new programs and major program changes should be determined and analysed. A *vision* of how the organization wishes to operate in the future should be developed along with an overall strategy for getting there and for recognizing opportunities and obstacles along the way. A review of information technology trends may suggest new opportunities to enhance the services of the institution.

Each organization in the institution should propose initiatives, some involving information technology, to improve the current performance and service of the institution as well as the future directions defined in the business strategy. Expected results should be expressed in terms of their anticipated contribution to improved program performance and enhanced service, and their predicted cost benefit. Using these preliminary assessments, the institution can establish its investment priorities and make an initial ranking of competing proposals.

3.2.2 Develop information technology strategies and plans

A strategic plan for the future evolution of information technology in the institution can be developed from the investment priorities and initial set of investment projects. Strategies should be derived from and strongly support the institution's business directions and plans.

This business focus allows the institution to define target *architectures* for information technology, that is, the long-range configurations of data, applications, networks and computer technology (hardware and software) that will best respond to the predicted needs and priorities of the institution. Initiatives can be defined to move the institution from its existing information technology architecture to the proposed new one. These architecture or infrastructure initiatives should also support, albeit indirectly, the approved business initiatives. The development of these architectures is evolutionary, not a single project, and the target architectures should change over time to reflect changed business priorities and new advances in information technology.

The linkage between the proposed architecture or infrastructure projects and program-support projects should be clearly understood and their expected results clearly defined in terms of their contribution to program performance and improved service. Technology projects do not have to be described in technological terms; they should be understood by all.

3.2.3 Establish expenditure levels

This analysis of information technology's role and contribution towards improved program performance should result in a clearer recognition and understanding of its importance to the institution. Senior management can consider proposals with an understanding of their relative importance to the institution as a whole. Management will also have an appreciation of the projected impact of any proposals on program performance as well as their linkage to the institution's Long Term Capital Plan, Multi-Year Operating Plan and other planning processes. Proposed investment levels can be justified by program managers based on expected results. From this analysis, an appropriate information technology expenditure level for the institution can be established.

When determining the appropriate expenditure level for information technology, senior management should also consider full life-cycle costs for their investments, e.g. design and development, implementation, operation and enhancements and eventual replacement. Experience has shown that operational expenditures on information technology rise in proportion to the investment in new systems. Often these costs are not budgeted for.

3.2.4 Approval of specific investment projects

A business-case approach should also be used to justify and approve specific information technology investment proposals. Note, however, that the extent of the justification required for an investment should reflect its size. The justification for a microcomputer, for example, should be considerably less than is required for a major investment. In many cases, a significant information technology project may be part of what is essentially a non-information technology project. Even though the overall project may be appropriately justified, the information technology project component should still be reviewed separately to optimize its contribution to the institution's goals and to ensure that it is in accord with the institution's architectural strategies for information technology.

This process can ensure that the optimum set of investment projects is chosen. Projects that provide the best combination of performance and service benefits include:

- improved service to the public;
- improved organizational effectiveness;
- maximized contribution to the institution's strategic objectives;
- improved response time;
- resource and cost savings;
- cost avoidance;
- revenue generation; and
- improved quality.

The main reasons for proposing the investment, how it links to the business strategy or plan and how it is consistent with the information technology architecture should all be stated. Whenever possible, expected business benefits and impacts should be described by the users of the system. In addition, the opportunities and risks of proceeding or not proceeding should be outlined.

A benefit and impact profile should be projected over several years. Quantifiable benefits and costs should be calculated as an annual cash-flow schedule and the net return or net cost summarized. The full costs of undertaking the investment should also be shown as an annual cash-flow schedule. Negative business impacts should appear in this analysis as costs.

Soft or intangible benefits should also be projected. Although this process is subjective, this information should be available to decision-makers so they can make an informed and effective decision regarding the investment.

If this detailed analysis of costs and benefits indicates that a proposed project is less desirable than others being put forward, it should be delayed or dropped, thereby allowing more attractive proposals to be selected.

3.3 Managing the benefits

Institutions should ensure that methodologies and controls are implemented to realize the benefits set out in the investment business case. This implies appropriate project management practices (refer to the Treasury Board Project Management

policy) to ensure the project is delivered within approved cost and time limits and that projected benefits are achieved. If these projected benefits are not achieved, applying the business-case approach at the investment level serves little purpose. All returns on investments should be captured and returned to the institution as a whole. In this way, senior managers can re-investment these resource savings in new initiatives.

4. Government Information and Technology Standards Program

4.1 General

This section encompasses all information and technology standards and applies to federal participation in all national and international information technology standards activities.

A Treasury Board information or technology standard is one that has been approved by the Treasury Board for mandatory use throughout the federal government. Treasury Board approval will usually be based on the following grounds:

- the standard represents a strategic direction that is in line with national and international trends and government policies and objectives, such as industrial development; or
- implementation of the standard will result in a significant benefit to the government by promoting compatibility, competition and optimization in its information technology.

The Treasury Board Secretariat is authorized to revise the technical content of a Treasury Board information or technology standard, provided the revisions are endorsed by the Advisory Committee on Information Management prior to their reissue, and there is no change to its overall intent.

4.2 Objectives of the Government Information and Technology Standards Program

The objectives of the Government Information and Technology Standards Program are:

- to increase effectiveness and economy in acquiring and administering information technology resources throughout government by promoting compatibility and interchangeability of equipment, programs, data and the characteristics of data. This, in turn, will extend the efficiency, usefulness, and life of systems; minimize duplication of data; optimize investments; facilitate information interchange; ensure proper security safeguards including business resumption planning; and allow the orderly replacement or upgrading of components;
- to establish a single process for developing, approving, implementing and maintaining information and technology standards throughout government, which includes a procedure to identify the need for and establish the priorities of standards proposed for government use, a process that ensures full institutional participation, and a mechanism to assign resources to government standards projects;
- to reduce duplication of effort and optimization of resources in government standards work;
- to increase the influence of the federal government, both as a user of information technology and as a policy-maker, in national and international standards organizations;
- to coordinate government participation in national and international standards activities;
- to share information with all interested parties on current activities in the field; and
- to improve and better coordinate strategies, based on common standards, among government institutions, common-service organizations and industrial development programs and policies.

The components of the Government Information and Technology Standards Program are:

- to improve and better developing, approving, implementing and maintaining federal government information and technology standards;
- as a user of information technology developing and presenting the federal government's position on a proposed new standard;
- coordinating the participation of federal officers in national and international standards work and the sharing of the resultant information; and
- providing ongoing liaison with other governments and the private sector where there is a common interest in standards issues.

4.3 The development, approval, implementation and maintenance of Treasury Board Information and Technology Standards

Government policy promotes developing, distributing and using information and technology standards to acquire, manage and use information technology effectively and to protect investments.

Standards are implemented when they meet a government strategic direction or result in a significant benefit. Whenever appropriate, Treasury Board Information and Technology Standards are national or international standards. The government develops new standards only when a need is specific to the federal government or when the accredited standards writing agency cannot assign sufficient priority to the proposal. When the decision is made to develop a new standard independently of an accredited standards writing organization, the standards developed by institutions such as other governments, NATO, and private sector organizations are reviewed for relevance and, if appropriate, adapted or adopted. As standards are approved for the government, institutions should make this information available to their responsibility centres, as appropriate.

The development of standards is voluntary, and technical content is based on the consensus of all the involved parties. In

standardization practice, consensus is achieved when substantial agreement is reached by concerned parties involved in preparing a standard. Consensus includes an attempt to resolve all objections; it implies much more than the concept of a simple majority, but it does not necessarily mean there is unanimity.

This section describes a process that is based on consensus. This process provides not only for developing and approving standards, but also for implementing them throughout government, for the ongoing maintenance of existing standards and for evaluating institutional compliance. Institutions participate in the development of standards by identifying and reporting to the Treasury Board Secretariat opportunities for standardization and by reviewing and voting on proposed standards prior to Treasury Board approval.

Institutions are expected to develop plans to achieve full compliance with Treasury Board standards once they have been approved. Each standard includes an introductory section which, among other things, defines the application of the standard and the anticipated length of time for full compliance to be reached across government. These are based on institutional comments during the approval process and the advice of the Advisory Committee on Information Management and other advisory committees.

4.4 The federal government's participation in information and technology standards activities as a user of information technology

The federal government maintains contact with standards user groups in other governments and in the private sector to share information and, when appropriate, to develop common positions on standards and their implementation.

Government policy requires that the activities of officers who represent the government as a user when participating in information technology standards activities be planned and coordinated. This will optimize the use of valuable resources and ensure that information is shared among government information technology managers.

Institutions should encourage their qualified officials to participate in developing, implementing and evaluating standards important to them. Institutions should also advise the Treasury Board Secretariat of personnel with relevant expertise to participate in government, national or international standards activities. In addition, institutions whose officers participate in national or international standards work as representatives of the federal government are responsible for ensuring that the federal government's position is developed, coordinated and presented to the standards body according to directives issued by the Treasury Board.

4.5 Coordination and monitoring of all federal government information technology standards activities

Government policy requires that the participation and activities of officers who represent institutions that are responsible for national programs or policies involving information technology be coordinated. This will ensure that all institutions with an interest in this work are involved and will keep government users aware of these activities.

Federal institutions also participate in national and international standards work within their mandates for national programs or policies. In this role, they represent a constituency wider than federal government users. An institution with such a mandate is responsible for selecting its participants and for developing a position on a standard that is in line with government policy. Such institutions should advise the Treasury Board Secretariat of their activities so that government users can be kept up-to-date and provide feedback in return. They may request the help of the Treasury Board Secretariat in identifying suitable government experts to participate in standards work. These participating institutions should inform all other institutions with relevant national program or policy responsibilities of their activities. In this way, these other institutions can become involved in the project if their interests require them to do so.

4.6 The information and technology standards development process

Standards development should be voluntary and cooperative in nature. The technical content should represent a consensus of the parties involved. This principle of consensus should apply to government standards as well as to national and international standards. This imposes a responsibility upon the organizations that initiate, develop and approve standards. The process within the federal government for developing, approving, implementing and maintaining information and technology standards is as follows (see Figure 1).

The main objectives of the process are the approval of government standards and confirmation that consensus has been reached. This process provides:

- a system to ensure that all interested parties are informed;
- balanced representation in working groups of those interested in the subject;
- review cycles long enough to permit response; and
- appropriate coordination among the various disciplines within government.

The process consists of five phases.

4.6.1 Initiation

As stated earlier, standards are implemented when they meet a recognized government strategic direction or will result in a significant benefit. Standards projects can, therefore, be initiated either as a result of monitoring national or international work or on the recommendation of any user institution or common-service organization.

From information received from institutions, from consultation with industry and from international standardization work, the Treasury Board Secretariat maintains a government standardization work plan. Wherever feasible, existing national or international standards are adopted or endorsed as federal government standards. It may occasionally be necessary to develop standards independently of accredited agencies, but normally this should happen only when the need is specific to the federal government, or when an accredited agency cannot give sufficient priority to the proposal.

Text version: Figure 1: The process for developing and approving government information and technology standards

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Figure 1: The process for developing and approving government information and technology standards

4.6.2 Development

The Treasury Board Secretariat normally convenes working groups from institutions and members of appropriate advisory committees to undertake specific tasks, such as defining requirements for government standards, assessing the applicability of standards produced by other standards bodies, and developing new standards. When deemed appropriate, working groups should include industry representatives or other members from outside government. Working groups should be dissolved when they have completed their assigned tasks.

To reach consensus, a working group may circulate several versions of a draft standard to voting institutions for review. The reasons for which institution have not accepted a draft are then used to develop the next one. After the merits of the standard have been verified and consensus is reached, the working group recommends the proposed standard and a general implementation schedule to the Treasury Board Secretariat for formal approval.

4.6.3 Approval

If necessary, the Treasury Board Secretariat refers the proposed standard to appropriate government advisory committees. Before Treasury Board approval, the Advisory Committee on Information Management is asked to review the validity of the development process and to comment on the impact of the standard and on the proposed implementation schedule. After this review, the proposed standard is submitted to the Treasury Board for approval.

4.6.4 Implementation

After the standard and its implementation plan have been approved, the Treasury Board Secretariat is responsible for overseeing the implementation plan. Typically, this requires institutions to develop timetables to comply with the new standard in all of their activities. In some cases, several years may elapse before equipment is replaced or large systems are converted as part of the normal maintenance or refurbishing cycle. Institutions are expected to report their progress towards compliance in their Information Management plans. Periodically, internal audit groups review their institution's conformity with Treasury Board standards.

4.6.5 Maintenance

Changes in technology or patterns of use may require changes to an existing Treasury Board standard. All Treasury Board Information and Technology Standards are reviewed when necessary, but at least once every five years. The action taken following this review depends on the use being made of the standard and the extent of technological change. Generally, the process for changing a standard is the same as that for developing it. Similarly, standards are cancelled when they are no longer relevant. When a Treasury Board standard is changed, it is reissued as an amended Treasury Board information or technology standard.

4.7 Approved information and technology standards

Chapter 2-1, Appendix C contains a list of the information and technology standards approved for government use by the Treasury Board. For specific details concerning these standards and their approved implementation and application criteria, refer to the Treasury Board Information and Technology Standard (TBITS) documents contained in the Information Technology Standards volume of the *Treasury Board Manual*.

5. Liaison of common-service organizations and lead agencies with clients

This policy requires common-service organizations and lead agencies in the information management sector to obtain advice, guidance and feedback from their clients. Common-service organizations and lead agencies are free to establish whatever method they feel is most appropriate to achieve effective liaison with their clients. To assist those in common-service organizations and lead agencies who may be considering establishing a client liaison process, the following general guidance is included. This may be adapted to particular circumstances.

Clients can provide the common-service organization or lead agency with advice and assistance in long-range planning and government-wide coordination. Good liaison will create feedback at a senior level by providing a forum for:

- exchanging information about the cost and effectiveness of services received from the common-service organization or lead agency and other sources;
- discussing major issues and problems affecting information management, and for suggesting possible courses of action;
- encouraging the evaluation of major information management initiatives in the government and the evaluation of present coordinating mechanisms in government; and
- discussing proposals for changes in policy, directives and guidelines regarding the planning, coordination, acquisition, operation, and evaluation of information management in government.

6. Education and training for the introduction of information technology

6.1 Introduction

The use of information technology over the past few years has become increasingly pervasive. In the past, a relative handful of technically qualified and highly trained personnel were actually involved in applying technology. The introduction of powerful personal computers and the continuing need to increase both productivity and quality of service to the public mean that this technology now has the potential to be used as an everyday working tool by virtually all staff (employees, supervisors and managers) in the Public Service.

The challenge we have is to effectively integrate the skills and potential of people with the tools provided by technology. The challenge should not be limited to the technology itself, but should be clearly focused on the people and their participation in change. We should accept the basic premise that people, not technology, are the key to increasing productivity and the quality of service to the public.

6.2 Purpose

In order to increase productivity and the quality of service to the public, education and training should be viewed as an investment. The obvious need is to create an environment where consultation and communication at all levels are viewed as the prime factors of success.

6.3 Scope

All staff (employees, supervisors and managers), whether directly or indirectly involved, will require varying degrees of education and training.

6.4 Information technology education and training guidelines

In order to clearly establish defined critical training points, the following three-phase approach should be implemented:

Phase 1 - Pre-implementation

This is the period following the decision to introduce technology and prior to the actual installation of equipment.

Management should ensure that a total awareness and sensitization program is implemented that has as its focus the need to:

- provide clear and direct information about the proposed change - questions regarding the what, why, when, where, and who should be addressed in detail;
- enhance confidence and motivation;
- foster participation and encourage creativity;
- provide an overview of the change, along with its expected benefits and possible effects and impact on people and work processes; and
- develop the necessary skills in managing, coaching, and using the equipment and software.

Phase 2 - Implementation and installation

This refers to the time at which those persons directly and indirectly affected by the technology are expected to use the system (i.e. after delivery or installation of the equipment).

Management should ensure that this phase addresses:

- the further development of competence and comfort in working with the new system;
- the creation of an environment that will encourage feedback from and to all staff;
- the further enhancement of understanding, knowledge, and skills;
- the need for additional skills training at all levels (managing, working) when and where needed; and
- the need to help all staff be effective in using the new system by providing adequate training.

Phase 3 - Post-implementation

This is the time when monitoring the effect of the change upon the organization from a people and systems point of view is taking place, and necessary adjustments are made.

Management should ensure that this phase addresses:

- the maintenance of effectiveness and job satisfaction;
- the continuance and enhancement of feedback from and to all staff;
- the need to make necessary adjustments so that skills training for managers, supervisors and employees continues; and
- the provision of ongoing training support.

7. Information technology in the workplace: planning for people

7.1 Introduction

In recent years, there has been increasing pressure to improve productivity in the Public Service as well as in the private sector. The effective use of technology is certainly one means to this end. Technology, however, has not always yielded the predicted results. Many studies describe why the results of technology sometimes fall short of expectations. More often than not, the problems are related to human factors. The people who use the new tools have rarely been consulted and there has been little effective strategic planning that would have assessed the implications on the work force. Training often consists of hands-on operation with little follow-up or coaching.

The challenge for managers is to achieve the best combination of human skills and tools provided by technology to realize the full potential of people. Implementing new technology is more than just installing equipment and software. It is, above all, an exercise in managing people, in guiding change, and in reshaping the work environment.

7.2 Purpose

The purpose of this guide is to increase government managers' awareness of some of the people issues that should be considered at the planning stage in order to realize the full potential benefits of information technology.

7.3 Planning for technological change

Experience has shown that information technology can improve productivity if its introduction has been carefully planned. Within the federal Public Service, planning strategies should concentrate primarily on:

- the mission and goals of the government and of the institution;
- the objectives of the change, organizational values and specific work environment; and
- the resources required to accomplish the task effectively.

Moreover, the planning process should take place in the broader context of the government legislative framework, policies, regulations and existing collective agreements. Managers should be familiar with all pertinent provisions in collective agreements relating to technological change. The participation of employees and their representatives in the consultation process will greatly facilitate the effective introduction of information technology in the workplace.

Since planning is a dynamic process, it should be based broadly enough to take into account some of the government-wide priorities such as improvement in the quality and level of service to clients, employee satisfaction and motivation, official languages, employment equity, human rights and revitalization of the Public Service. The challenge for managers at the planning stage is to integrate the technology factor with the people factor. When these two factors interact harmoniously, the result is a better motivated work force and a more effective and productive organization.

The approach used in this guide is based on a practical strategic planning model that incorporates human-resource issues at each stage. A complementary approach to implementing new technology at the project-planning stage is described in *Changing Technologies: Human Resource Management Considerations*, a 1984 Treasury Board Secretariat publication. Although the strategic- and project-planning approaches focus on information technology management, both models are generic and can be applied to any workplace where change is a major factor. The strategic planning process outlined in this guide, and illustrated in Figure 1, calls for these questions to be addressed:

- where are we now? (assessing the situation);
- where do we want to go? (setting strategic objectives);
- how do we get there? (developing a strategy);
- how do we make it happen? (formulating the plan);
- how do we put the plan into action? (implementing the plan); and
- are we doing the right things? (measuring progress against the plan).

7.4 Stage 1 - Where are we now? (Assessing the situation)

The response to the question, "Where are we now?" involves a thoughtful assessment of the situation in which the institution currently finds itself. This is the logical point of departure in the planning process, and the following questions should be asked:

- what are the institution's missions and goals?
- what are the organization's strengths and weaknesses?
- what opportunities does the change offer and what risks are involved?

Text version: Figure 1: Strategic planning model to address the issues affecting people when there is

technological change

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Figure 1: Strategic planning model to address the issues affecting people when there is technological change

- how does the proposed change correspond to institutional objectives and strategies, and is the change reasonably achievable?
- are management, employees and union representatives ready to endorse the change?
- to what extent will the change affect people, jobs and work relationships?
- is the organization ready for change? and
- who are the beneficiaries and who stands to lose as a result of the change?

Managing change effectively may require challenging existing values, as well as the culture within the organization. It should, therefore, involve careful consideration of the social, institutional and technical aspects of change to optimize the effectiveness of the change itself.

7.4.1 Management considerations

Change always has an impact on people. The effects differ according to such factors as age, education, experience and readiness. Managing change effectively goes beyond acquiring new skills and knowledge; it depends on recognizing individual employee needs, including official language considerations.

Institutional policies may need to be reviewed and some of them changed. Institutional policies should provide clear statements of intent. They are essential to setting objectives, making decisions and taking action. They should be so structured and worded as to reduce confusion and uncertainty among staff who are affected by the change. They should also act as catalysts for developing innovative ways of meeting goals and objectives.

7.5 Stage 2 - Where do we want to go? (Setting the strategic objectives)

Projects involving the introduction of new technologies often fail or fall short of expectations because they lack focus, are not part of an overall, well-defined strategy and lack any real involvement of the people affected. It is important, therefore, to take into consideration the long-term goals of improved institutional effectiveness and service to the public, as well as the continuing objective of enhanced employee satisfaction. Without a strategy to unify these factors, the process may become fragmented and ineffective. Managers should, at this stage, set objectives that will answer the following:

- in what direction should the institution move to ensure that project objectives are consistent with major long-term operational goals?
- how can the change be managed to ensure that it remains consistent with and relevant to the strategic objectives of the institution?
- how can new technology be used to realize these objectives?
- how long will the current institutional goals remain relevant? and
- what kind of investment should we make in new technology?

7.5.1 Management considerations

Establish what will be done about the people affected. Ensure that training, retraining, job and organization redesign will be considered as priorities, and that information will be available about the nature of the change. Well-informed, involved employees feel more secure, are better motivated and more open to change than those who are uninformed. Performance also improves as employees realize the potential of a new and challenging work environment for which they have been well prepared.

Integrate the strategic objectives with current realities; for example, where employees need new skills to operate the technology involved, training is essential. There may also be a need to redesign jobs and relationships to create a more effective organization.

Develop a training and retraining strategy, but recognize that training alone will not bring about all the solutions to achieving organizational change. Training is costly, labour-intensive, time-consuming and can be disruptive to the operation. Nevertheless, training is also an investment. Its results often determine where people will best fit into a renewed organization and how their individual potential can best be developed.

7.6 Stage 3 - How do we get there? (Developing a strategy)

The major aspects of change should, at this stage, be reduced to workable components that are easily understood and accepted. These components should be small, manageable and specific, and should demonstrate short-term results. Once the direction is set, it also becomes easier to assign priorities and resources. Action plans will emerge from this process, together with performance indicators and expected results. Questions at this stage might include:

- how can we ensure that the objectives are easily converted into activities, performance targets and planned completion dates?
- what communications plan do we require to allow employees to understand and participate in the change process? Who will be responsible for it? Is a policy decision needed?

- are there appropriate consultative groups in place?
- does the organization have effective ways and means of getting employee input? and
- who are the responsible managers, consultants, stakeholders and beneficiaries important to the project? What will their respective roles be?

7.6.1 Management consider

An incremental approach to implementation will allow policies and procedures to be developed and adjusted gradually for the users. Change ought to be carefully considered and gradual, giving people as much time as possible to adapt.

A well-designed office environment in which people can make the best use of equipment and facilities in performing their duties will ease the transition from the old to the new work environment. Equipment design, furniture heights, levels of artificial lighting, ventilation, temperature, natural lighting, acoustics and privacy should be accorded particular attention. Employee performance also depends on a sense of well-being and comfort in the workplace. For example, any task that requires employees to remain in the same position for long periods of time will generate stress and physical strain that, in turn, will adversely affect productivity.

Provide employees with equipment and systems that accommodate their language of choice. This will also contribute to effective employee performance.

7.7 Stage 4 - How do we make it happen? (Formulating the plan)

To be successful, the strategic plan should become a road-map where reference points, milestones and general directions taken by the planners will be communicated to people. These people will, in turn, have or be given opportunities to influence decisions. Questions at this stage become even more practical and are usually based on short-term expectations.

- what is the best way to include people in teams organized to solve problems? Who will be included?
- how can effective team leadership be created?
- how can training programs be used to prepare employees for the change?

Management cons

The human-resource management plan should take into account all changes that will affect employees collectively and individually, notably:

- technical requirements;
- new job content - changes in attitudes and work relations;
- new skills and knowledge requirements (including language requirements);
- social needs; and
- any additional requirements that may create problems for the organization as it adapts to new techniques and ways of doing work.

It is essential to anticipate the effects of innovation on individual workers and to understand that individuals will have to develop new skills to adapt to change. A sound human-resource plan permits resources to be redeployed to anticipate any work-force or other difficulties well in advance of implementation.

Constant communication should be maintained with unions, service users and other agencies. Feedback mechanisms should be established to provide advice, information and support. The workplace should function in a climate of mutual trust, respect and loyalty. It is the responsibility of managers to create a climate of openness among all participants.

Employees and their representatives should be involved in the innovation process. Employees tend to be more committed to decisions in which they have participated. When staff are offered the opportunity to respond, to understand and cooperate, bad feelings, problems, grievances and disputes are less likely to arise. Allowing employees to participate in decision-making also provides a systematic way to tap their experience and expertise. Failing to consult with employees creates communication problems, increases anxiety, intensifies frustrations and ultimately lowers employees' acceptance of change.

Training and education programs should be carefully planned. As the new work requirements become more specific, employees requiring training and their training needs should be identified. It is important to provide this training in the employee's choice of official language. Well-prepared, informed employees accept change more readily than uninformed employees. Training also reduces stress, supplements employees' qualifications, and encourages staff to become more versatile and useful to the employer and more confident in themselves. Ensure that training budgets and plans are respected. Although training is usually planned for, the costs are often underestimated. If budget cuts have to be made, it is preferable to consider phasing in the systems over a longer period rather than reducing training. We should not trade off equipment for training.

7.8 Stage 5 - How do we put the plan into action? (Implementing the plan)

As noted earlier, the implementation of technological change should provide opportunities for organizational renewal, individual job enrichment and personal growth for those involved. Highly motivated people, challenged by change, can accomplish results beyond anyone's initial expectations. In particular, individuals cooperating as a team can collectively generate superior results. Whether the earlier objectives, strategies and operational plans were well-conceived will inevitably show up in the implementation stage in response to the following questions:

- can supporting systems, procedures, project controls and reviews be successfully incorporated into the change process?
- have the major training and development needs and requirements been met?
- do we have the financial and human resources needed for successful implementation?
- can senior staff provide sufficient informed leadership and management?
- how can people communicate their accomplishments and help to correct problems? and
- have the implementation milestones been identified and the reporting responsibilities been redefined?

The Treasury Board publication, Changing Technologies: Human Resource Management Considerations, will be most helpful at this stage. It can be used by managers as a checklist of key human-resource management issues they may want to consider in the change process.

7.8.1 Management considerations

Identify and redesign jobs that are affected; assist people in anticipating change that will almost certainly affect their career development plans. People prepared for change are more amenable to it. They are less apprehensive about how it will influence their lives.

Help design new work arrangements to accommodate the new technology. Part-time work and job sharing, as employment options, may reduce costs, permit flexibility in job scheduling, meet individual employee's needs and satisfy new management priorities.

Develop and provide sustained training at every step of implementation. Part of what people learn is often lost if training is given too early or too late. Furthermore, people can only absorb a given quantity of knowledge at any one time.

Train motivated or key end-users first. They usually become steadfast advocates of the change and effective leaders in the change process.

Integrate new management and supervisory practices such as employee participation. Employees should cooperate to combine new skills and knowledge and to teach each other.

7.9 Stage 6 - Are we doing the right things? (Measuring progress against the plan)

Throughout the implementation phase, progress should be monitored and compared with expected results, and corrective action taken as required. Progress should be assessed by comparing measurable indicators of performance against established targets.

At this stage, it is vitally important that managers be well-informed of the findings in order to effectively implement recommended corrective measures. Subsequently, results would again be evaluated and further corrective action taken, if necessary, until all functions are working smoothly.

Again, participation and involvement of employees will pay dividends. Highly motivated, enthusiastic people with focused objectives can solve problems creatively with minimal intervention. Uninformed employees, on the other hand, can create crises and cause constant difficulties. It is clearly the manager's responsibility to correct any deviation from the basic objectives by responding to such critical questions as:

- what criteria are required to assess overall quality and productivity improvement?
- have assessment, evaluation and audit activities been properly identified and defined?
- to what extent has change been effectively achieved? and
- what interventions are needed to correct deficiencies?

7.9.1 Management considerations

Build results of the implementation review into an action plan to maintain the new activities in an operational environment. This ensures a smooth transition of responsibility from those who plan and implement the project to those involved in managing it on an ongoing basis.

Review objectives and set measurable targets and indicators to ensure that people are functioning productively in the new work for which they have been trained.

Communicate results of assessment and evaluation reviews to those involved. This will provide opportunities for people to make their own adjustments and to contribute to further improvements in work methods.

Ensure that training is kept as an ongoing priority.

8. Office-support systems

8.1 Background

Inexpensive, yet increasingly powerful, multi-functional office-support systems with a wide choice of software products that can be used quickly and easily by novice users are being promoted by vendors as the answer to many problems faced by

managers. In spite of their affordability and ease of use, their acceptance has resulted in two major concerns. Firstly, they are proliferating rapidly and, if order and control are absent, major problems requiring expensive solutions can develop. Secondly, the impact of these systems on the organization can be enormous.

8.2 General principles

All office-support systems, including personal computers, word-processing systems or terminals, fall within the purview of the Treasury Board Management of Information Technology policy. The various constituent elements of office-support systems are to be considered within the perspective of overall institutional use and management of information technology. Acquiring and managing information technology continues to be delegated to institutions.

8.3 Potential benefits

Office-support systems provide important benefits to any organization because of:

- the relatively low cost of an office-support system that can usually be justified by a single application;
- limited risk associated with experimentation and imaginative use of the equipment, provided that the success of such projects is reviewed after a fixed period;
- the ease of installation and use; no special physical environment is necessary;
- the ready availability of hardware and a wide variety of software, which eliminates the long lead times associated with larger scale systems;
- the capability to act as a terminal to corporate mainframes and minicomputers as well as outside databases; and
- the fact that office-support systems can be used for specialized and ad-hoc requirements, thus allowing central computing power to be used more consistently for corporate applications.

8.4 The need for institutional action

The relatively low cost of office-support systems has been used to argue that such acquisitions should be free of controls of any kind. While that approach might be defensible on a small scale, experience has shown that this view ignores a number of important considerations.

8.4.1 The true cost of office-support systems

The initial cost of an office-support system is only a small part of its ultimate true cost to the institution. Additional expenses have been found, by experience, to be from two to six times the initial cost of the hardware. These expenses include training (including the cost of employee time while on training), additional software, additional peripherals, additional furniture and office space, charges for access to public databases, work to provide the appropriate telecommunications infrastructure, work in the institutional data centre to make data accessible to office-support system users, the provision of advisory services, arrangements for back-ups, maintenance, and additional costs for subsequent physical moves.

Compatibility and the capability of integrating systems into larger networks are important considerations that should be dealt with early in the planning stages. This is necessary to ensure that the equipment will be utilized to its full potential and to avoid redundant capital investment as institutional requirements change.

The government's long-term strategies of having interconnecting open systems and portable applications should be considered, and compliance with approved government standards is required in applicable procurements. Where existing investments in proprietary architectures are significant, institutions should develop plans that permit them to use conforming items as soon as possible.

8.4.2 Concerns regarding the security and integrity of information

As with conventional paper records, information stored on computer media should be carefully indexed, filed, and protected. It is important that the reliability, integrity and security of data stored in office-support systems be maintained. This is particularly true for information that is input directly into these systems and not stored in non-electronic form. The policies and practices that have been developed in this area by the institutional information technology centres need to be adapted and applied in the context of office-support systems. Guidance on this subject is also available from National Archives of Canada and security offices.

Corporate information needs can be compromised by the improper use of office-support systems for end-user computing. If managers can satisfy their own personal requirements with an office-support system, they may give only secondary attention to institution-wide systems, thus inadvertently undermining the need for information at the institutional executive level. The requirements of the Management of Government Information Holdings policy and the government Security policy are to be applied to office-support systems.

8.4.3 Providing continuity

The need for adequate documentation of operational systems that are developed and run on office-support systems is often not recognized; as a result, the continuity of the function is seriously threatened when the originators of the system leave the organization.

8.4.4 The impact on employees and the organization

Managers should consider the effects of introducing office-support systems into an office so that anticipated benefits are not cancelled out by unforeseen problems. The impact of office-support systems on employees' work habits, quality of work and job functions, on the organization, and also the potential for job displacement or job change all need to be considered before office-support systems are acquired. It is important that employees are fully informed and participate, as appropriate, so that fears based on misinformation do not develop. For additional guidance on this topic, refer to sections 6 and 7.

8.4.5 The need to provide training

Although a good case can be made for controlled experimentation, there is also a risk of inexperienced users in many areas duplicating the efforts of others and re-inventing the wheel. Inexperienced users tend to overestimate the expected benefits. At the same time, they underestimate the effort required to enter large amounts of data into a system and the amount of training required to be able to perform effective data retrieval and to generate reports. It is not uncommon for disillusioned users who do not receive adequate support to give up trying to use their office-support systems after a few months of frustration. Refer to sections 6 and 7 for additional guidance on this subject.

8.4.6 Institutional policies

Institutions should include reference to office-support systems in their information technology policies. While each institution will wish to address its specific concerns and reflect its own management philosophies in formulating its office-support system policy, institutions may find the following guidelines useful.

8.4.7 Inventories and acquisition

Institutions should maintain an inventory of the various elements (e.g. hardware, software, and networks) of their office-support systems as part of their overall computer inventory. Office-support system equipment and software should be defined as an institutional resource.

To reduce acquisition costs, institutions should purchase office-support system equipment and software from national master standing offers or should establish their own individual standing offers.

8.4.8 Support for Canadian industry

In meeting their specific needs, institutions should address their requirements for office-support systems in generic terms, as much as possible, to encourage the consideration of office-support system products that maximize benefits to Canadian industry.

8.4.9 Justification of the acquisitions

Institutions should ensure that, depending upon the type of acquisition (e.g. pilot project or system implementation), an appropriate business-case analysis that addresses such aspects as the cost-benefit, compatibility with other equipment, productivity pay-backs and impacts is carried out before office-support systems are acquired. In particular, the acquisition should be explicitly linked to the institution's Information Management Plan. Institutions should also ensure that the extent of these studies is reasonable for the expenditure involved, keeping in mind that the ultimate cost may be two to six times the initial investment, that the acquisition may be only the first of several for that office and that the acquisition should be supportive of institutional productivity-enhancement programs and operational plans.

8.4.10 End-user programming

Institutions should prepare guidelines for users on the expected level of end-user programming. It is not generally cost-effective for users to devote extensive time to programming their applications. Professional programmers should be responsible for such programming, while users employ the office-support system as a tool to assist them in their function. The use of commonly available software packages should be encouraged and the duplication of software development should be minimized. Turnkey (i.e. ready-to-use) application software should be supplied to non-expert users whenever possible.

8.4.11 Documentation of operational systems

Institutional standards should stipulate the documentation that is required for continuing operational uses of office-support systems to ensure data security, data integrity and continuity of use of the application if trained personnel leave.

8.4.12 Standards for interconnection and portability of applications

The benefit of office-support systems is generally much greater when these are networked together. When appropriate, institutions should adopt standards for interconnecting open systems and portable applications between office-support systems, networks (public and private) and the institution's central databases and systems to ensure mutual compatibility. Although office-support systems may be purchased as stand-alone units, all such acquisitions should conform to these standards (i.e. the question of interconnection and portability should be examined), not just those that have been initially identified as being linked together. Guidance in this area is available from the Government Information and Technology Standards Program.

8.4.13 Security

Institutions should ensure that adequate security provisions are put into place and maintained for all micro-based applications for both equipment and data. These provisions should recognize that there is likely a lack of knowledge and expertise in this type of security in user areas. Advice should be sought from the institution's security officer.

In particular, institutions should advise computer users on practices and procedures to protect their systems and data from computer viruses. Computer viruses are malicious programs which can attach to other programs or data and propagate copies of themselves. These copies then infect other programs or data and, after some predetermined event, execute their malicious code. To guard against damage from viruses, institutions should ensure that virus scanning programs are widely available and distributed to users. These programs are inexpensive and available off-the-shelf. In addition, users should:

a. avoid practices that allow viruses to spread such as:
    - introducing programs or data from questionable sources such as computer billboards (suspicious items should be tested on a dual floppy machine without a hard disk);
    - trying problem programs on other machines to see if errors repeat; or
    - transferring files from other computers (a home computer, for example) that are not as well safeguarded as their computers at work;
b. be alert to any suspicious happening on their computer such as unexpected disk activity, files that change in size for no reason, or any unexplained errors; and
c. immediately quarantine any computer suspected of having been infected by a virus until it has been checked and cleared by an expert (refer to the institution's security officer).

8.4.14 Priority given to productivity improvement projects

Institutional procedures should give priority to proposed acquisitions that promise definite productivity improvements in terms of reduced resources, measurable improvements in approved service levels, or offsets to justifiable future resource requirements. Subsequent reviews of implementation should ascertain that these improvements were achieved or should identify the reasons why they were not achieved. These experiences should be fed back into the institution's planning and approval process, including budgetary incentives or constraints, as required.

8.4.15 Transfer of knowledge among employees

Institutions should develop procedures to allow knowledge of office-support systems and software products gained by employees to be transferred to other employees. Where size warrants, institutions may find it appropriate to set up a small office-support system advisory or training group to provide this function; otherwise, an expert user should be appointed as a coordinator. Other institutions may contact the Management of Information Technology, Office of Information Management, Systems and Technology, Treasury Board Secretariat, which will assist in locating sources of expertise. To facilitate the training and sharing of expertise, institutions may wish to standardize or restrict the range of office-support system products that may be acquired, and may wish to establish Information centres.

8.4.16 Involvement of information management common-service organizations

Information management common-service organizations have acquired considerable expertise in many areas common to both large computers and office-support systems such as telecommunications, electronic mail, data and records management, security, software, standards and documentation. This expertise should be used to solve office-support system issues. In particular, they have the knowledge to consider alternatives that can achieve cost savings and operational benefits, and minimize risks of failure.

8.4.17 Management of risk

In developing policies and in establishing institutional standards and procedures, institutions should recognize that office-support systems represent a new, rapidly evolving technology. It is important to provide an environment that encourages creativity, where some experimentation can be fostered. However, to counter the risks implicit in this approach, institutions should maintain an overall perspective of the implementation of various office-support systems that are under way. These should be reviewed periodically so that the equipment from unsuccessful projects can be recycled, and an overall direction may evolve and be developed.

8.4.18 Software copyrights

The institution's office-support system policy should contain specific directives to respect the copyright on computer software, specifically by prohibiting illegal copying of software. To reduce the cost of individual purchases of copies of the same software package, and thereby discourage illegal copying, institutions should try to negotiate site licences or discounted bulk purchases.