MINISTRY OF FORESTS

INFORMATION RESOURCE MANAGEMENT PLAN
2001-2004

OCTOBER 2000

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Part I – Executive Summary

The objective of the Information Resource Management Plan (IRMP) is to outline strategic Information Management and Information Technology (IM/IT) development within the Ministry of Forests over the next 3 years. These developments will enable execution of the ministry's performance plans. Specifically, the IRMP describes the current IM/IT environment, the target IM/IT environment (in 3 years), the technology strategies to achieve the target IM/IT environment, adherence to corporate standards, and high-level IT budget allocations.

This document serves two purposes. One, the IRMP is a means of communicating to ministry staff, IT developments expected to occur within the next 3 years. These expected IT developments take into account both ministry business needs (current and anticipated) and IT advances. Understanding the direction of IT development enables ministry users to apply or exploit IT service offerings to meet their future needs, and to develop applications that take advantage of the "expected" infrastructure. Two, the IRMP is reviewed by Information Science and Technology Agency (ISTA) and Treasury Board to prioritize funding requests, ensure standards are being met, and identify common infrastructure needs from a cross-government perspective. Therefore, this document is addressed to both ministry and central agency staff.

The IRMP is a living document that will change over time, so that we can benefit from technology advances and align with changes to the ministry's strategic objectives.

Related Documents

The IRMP complements both the Ministry of Forests Business Plan 2000 – 2001 and the Ministry of Forests, Information Management Group Business Plan 2000 – 2001.

The Information Strategy 1997 – 2000 identified several opportunities for improving on the information management and technology environment. The ministry has either embraced or initiated investigation of all technology solutions identified in that plan. Further investigations have been incorporated into the current IRMP.

The BC government has initiated InfoSmart, "a framework to fundamentally improve the way the government of British Columbia works and how it delivers services to people." "To implement the framework, government will concentrate on four strategic areas –

government-wide information management, common information technology (IT) infrastructure provision and management, electronic service delivery and IT staff resources." The ministry is cognizant of this initiative and the IRMP is aligned with InfoSmart's objectives.

Ministry of Forests

The primary mission of the Ministry of Forests is to:

> Manage, conserve, and protect the province's forest and range resources in a manner that balances economic, ecological and social benefits for all British Columbians.

The ministry has established three strategic goals for 2000-2001 that are aligned with its mission. They are:

1. To manage, conserve, and protect forest and grassland ecosystems for sustainable use now and in the future.
2. To help ensure that the province's forest, range, and associated recreation resources contribute to the economic well being of its citizens and communities.
3. To be a strong, dynamic, and adaptable organization focused on achieving its strategic goals.

In meeting these goals, the ministry is faced with socio-economic pressures such as global competition, industry mergers and acquisitions, trade agreements (and disputes), and growing public sentiment towards environmental value. These increasing market challenges come at a time of diminishing resources within the ministry.

In support of these goals, the ministry has undertaken a number of public initiatives such as results-based Forest Practices Code, Timber Supply Review, Land Use Planning, Forest Policy Review, and operational initiatives such as Data Service Centres, INCOSADA, Corporate Resource Management Data Warehouse, and protection systems. Through these initiatives, the ministry has focused on streamlining Forest Practices Code processes, land use planning, discussions of forest policy changes, participating with business partners, providing on-line access to documents, providing for data exchange and sharing capability, and mobile resource tracking.

Ministry of Forests - IM/IT Strategy

The ministry's IM/IT strategy in the next 3 years involves translating business needs into IT requirements as well as incorporating technology opportunities that enable or support business applications and operations. Therefore, it is critical for the ministry to make effective use of IM/IT and to exploit technology opportunities in

achieving its strategic goals amidst market and operational challenges. The technology strategies outlined in this IRMP reflect the ministry's business needs for electronic service delivery, partnerships, data sharing, improved data and information management, electronic commerce and data interchange, a secure computing environment, and legacy systems migration.

The IM/IT strategy continues to evolve in the areas identified in the last strategic plan as well as, incorporates new requirements and advancements. The activities will focus on the following areas:

- providing a wider range of electronic business opportunities including electronic commerce and data exchange
- improving data and records management
- enabling ready access to data for both internal and external users
- enabling greater mobility by providing electronic capabilities in the field
- providing a responsive application development environment to meet evolving business requirements
- filling in gaps in operational systems based on ministry priorities
- managing the transition of legacy systems

Major components in the IRMP include:
Electronic Service Delivery
- developing an e-business platform comprised of web servers for inter-, intra-, and extra-net usage, a web development environment for building web-based applications and a spatial web server for internet access to spatial data
- increasing use of internet-based data exchange technologies to handle increased volume (in terms of both data and clients)

Information Management
- providing improved data collection and management processes to reduce redundant data entry, increase consistency and quality of data, and provide more effective links between applications. This includes increasing the use of remote data entry/edit devices at the field level, as part of an improved mobile office concept.
- implementing a corporate resource management data warehouse for data sharing with resource agencies such as Ministry of Environment, Lands, and Park, Aboriginal Affairs, Land Use Coordination Office, and Energy and Mines.
- completing implementation of INCOSADA

- continuing with data modelling activities

Applications
- integrating electronic information management tools with workflow processes
- providing new or enhanced applications to meet the needs of business, with particular focus on revenue, roads management, compliance and enforcement, and a separate integrated forest management application solution for the Small Business program

Legacy Applications
- improving business practises by revising and migrating legacy components or systems to better meet current regulatory, revenue, stewardship and enforcement roles

Security of Systems and Information
- enhance security services

Infrastructure
- upgrading to faster networks as they become available and are cost effective
- upgrading infrastructure to service growing computing demands
- planning and implementing a phased upgrade to the radio network as a result of narrowbanding and spectrum redeployment
- continuing to investigate satellite communication with respect to the real-time electronic tracking of resources

Retirement of Outdated Technology or Applications
- commence migration of legacy systems
- continue with workstation, printer, and plotter upgrade strategy
- introduce a sustainable multi-year plan for software with funding commitments

Obstacles that may interfere with enhancing the IM/IT environment to deliver a greater number of services electronically include:

- reduced funding. This also extends to training of staff.
- organizational downsizing
- scarce human resources
- timely agreement of business decisions
- completion of IT or business pre-requisites
- immaturity of e-business and document management technologies
- problems associated with integration to existing technology and infrastructure

The ministry's IM/IT environment is largely compliant with

government corporate IT standards. Some legacy areas
remain such as the DB2 database and the token ring
network. The ministry plans to migrate these components
to current standards over the next 3 years.

Part II — Introduction to the Ministry of Forests

The British Columbia Ministry of Forests is the steward of the timber, range, and recreation resources of British Columbia's unreserved public (Crown) forest land, which covers two-thirds of the province (about 59 million hectares). The Forest Service manages this land for many uses, including recreation, forage, timber, and wilderness, and, in cooperation with other agencies, for water, fish, wildlife, tourism, heritage, and minerals. The Forest Service is a diverse organization and is geographically dispersed around the province.

The ministry's core business functions are regulatory, stewardship, enforcement, and small business activities.

Ministry of Forests - Mission

The primary mission of the Ministry of Forests is to:

Manage, conserve, and protect the province's forest and range resources in a manner that balances economic, ecological, and social benefits for all British Columbians.

Ministry of Forests – Strategic Goals

The strategic goals of the Ministry of Forests and the business areas associated with them are:

1. **Manage and conserve forest and grassland ecosystems for sustainable use now and in the future.**

   Regulation of forest and range practices
   Land use planning
   Timber and range supply determination
   Improving the knowledge base of Goal 1 activities

2. **Ensure that the province's forests, range and associated recreation resources contribute to the economic well being of its citizens and communities.**

   Market access
   Protection of the forest and range resources
   Forest road infrastructure
   Forest and range productivity improvements
   Non-timber/non-range benefits
   Tenure administration
   Small business
   First Nations relations
   Revenue collection
   Improving the knowledge base to support Goal 2

activities

3. **Be a strong, dynamic and adaptable organisation focused on achieving its strategic goals**

   Human resource management
   Corporate Governance

Environmental Scan - Forestry

The forest sector is going through a time of change as a result of new and emerging socio-economic pressures. Examples include global competition, industry mergers and acquisitions, market pressures for forest product eco-certification, changes to traditional markets including new restrictions under the Canada-U.S. Softwood Lumber Agreement, rapid technological changes, and increased citizen concern over environmental values. These challenges must be balanced with the ministry's mission and have been/are being considered by the various ministry initiatives and programs such as the Forest Practices Code, Timber Supply Review, and timber harvesting.

The forest industry is actively adopting new technologies to adapt to the challenges of managing in a complex rapidly changing environment. Increased use of electronic business practises is being undertaken to streamline processes, manage the large amount of data and increase cost effectiveness. This provides opportunities for partnering, improving electronic interaction, and data sharing between the ministry and forest industry.

The public has demanded greater access to information about the resources and is increasingly looking to electronic methods to obtain it.

Environmental Scan – Information Technology

The rapidly growing pace of technological developments, in particular internet and internet-derived technologies, has given rise to the concept of web-time (i.e. months). Technology is now measured in web-time as product development and time to market cycles have shortened considerably. As a result, there is a plethora of new technologies such as Storage Area Networks, Public Key Infrastructure, application servers, web servers, Java, and workflow engines in the marketplace.

Major trends and preferences in IT include:

- utilization of increased network bandwidth to enable greater centralized management of information and technology assets
- ubiquitous computing and connectivity

- greater use of Web technologies; establishing B2B (business to business) and B2C (business to citizen) services.
- growth of wireless technologies
- growth of technologies offering and requiring greater bandwidth
- applications being extended by or based on internet technologies
- network dependent, server-centric applications
- component-based development and re-use of components

IM/IT is a major component of the ministry as it provides the infrastructure to collect, manage, and analyze vast amounts of information necessary for ministry management and decision-making. Many ministry business activities are dependent on system functionality to operate. The rapidly changing IT industry presents improvements and opportunities, as well as challenges to implementation and change management within the ministry. Therefore, adoption and integration of new IM/IT technologies must be carefully considered, so that organizational effectiveness and efficiency ensue.

Part III – Current IM/IT Environment

The current IM/IT environment provides the ministry with the following capabilities.

Enabling Business
- computing and data management services for all major business activities (e.g. resource inventory, revenue, tenure, and enforcement)
- electronic access to ministry information and data
- electronic data sharing with business partners and clients
- office productivity tools including a reliable and ubiquitous electronic mail service. Capability for secure transactions (e.g. Public Key Infrastructure (PKI))
- modern spatial analysis tools
- real-time tracking of resources to provide greater safety and management of personnel and equipment

Infrastructure
- wide and local area network services in almost all ministry locations
- web servers providing intranet, internet, and extranet services
- application servers to host business applications
- desktop, laptop, and handheld computing hardware with mobile computing services in some locations
- data standards, exchange formats, models, and data dictionaries
- large scale, secure databases
- security tools and systems
- change management, training, and support services
- voice services including cellular and voice mail
- extensive radio network covering all operating areas of the province

Appendix I describes in greater detail, the current IM/IT environment.

The ministry's approach to information technology is one of in-sourcing and out-sourcing. Development and delivery of information technology services is primarily outsourced. For example, application developments, Information Management Group help desk, and application maintenance. Project management is predominately in-sourced.

Progress Towards Corporate Standards

The ministry is compliant to BC government corporate standards as identified below:

- desktop hardware standards
- desktop software standards (NT4, Office 97)
- NT server standard
- NT server hardware standard
- NT server software standard (NT4)
- desktop and server ADE standard
  - Database
    - Oracle for enterprise and workgroup use
    - Microsoft Access for standalone use
  - Language
    - Developer2000
    - Delphi
    - C++ for utilities
  - Reporting
    - Oracle Reports
    - Crystal Reports
  - Web Applications
    - HTML
    - Javascript, CGI, Perl, ASP
- MVS ADE standards
- VM ADE standards
- security policy standards

The ministry is not compliant with its use of:

- DB2 database - Many of the ministry applications are legacy in nature. The ministry intends to complete migration of these applications to newer technologies and platforms in 2004. At which time, it will comply to the government standard database, Oracle.
- Token Ring LANs – The ministry is in the process of converting all its LANs to ethernet.

Major Maintenance Activities Scheduled For The Next 3 Years

The ministry has a large installed base of hardware and software. To ensure operational business continuity, the ministry will continue to maintain existing services and infrastructure. Regular maintenance will be carried out on existing corporate applications but emphasis will be placed on the development of new business processes and migrating legacy applications. Maintenance of legacy systems will be minimized until they have been migrated to the new environment.

Constraints and Environmental Factors

A number of environmental factors impact the

delivery/operations (i.e. maintenance effort) of the technology infrastructure. These environmental variables include the number of business applications, budget, human resources, technology issues, and business constraints. The ministry has numerous inter-related business applications. Many of these are legacy applications. The business applications suite has not kept pace with change in the business requirement. This has led to a loss of confidence in corporate solutions and staff frustration.

Reduced IT budget and fewer IT human resources have presented challenges to maintaining/enhancing this architecture. Reduced budgets and few IT human resources will significantly impact the delivery of the target IM/IT environment, both in terms of the services offered and scope of implementation. Related to this, funding for training must be committed (i) initially to meet planned implementations, and (ii) on an ongoing basis to ensure full utilization of the services offered in the target IM/IT environment. For example, additional funding must be considered for remote locations with high staff turnover.

Technology issues also affect the achievement of the target environment. In general, integration issues are likely to affect the incorporation of new technologies into the existing infrastructure and hence the achievement of the target environment. Typically, new technology offerings are immature and have shorter life expectancy. The ministry has not made all the necessary changes to adapt to this reality.

The business environment also constrains the contribution of IT benefits. This may be due to the under-utilization of IT systems or to non-delivery or slow delivery of pre-requisites of IT systems. For example, untimely delivery of data, or lack of agreement and inability to define standards or adopt common business practices.

Lack of funding is a barrier to the ministry achieving full compliance to the corporate standard of ethernet LANs.

Funding and complex logistics associated with numerous inter-related business applications are barriers to the ministry achieving compliance with the corporate database standard, Oracle.

Part IV – Target IM/IT Environment and Strategies To Achieve It

This section describes the (i) business needs or IT requirements from a business perspective, (ii) the target IM/IT environment over the next three years from an IT perspective, and (iii) the strategies to achieve the target environment. The ministry's target IM/IT environment consists of the technology infrastructure enabling and supporting business operations.

Business Initiatives and Objectives

The business areas with their resultant initiatives, objectives and ongoing operations generate business requirements for IM/IT. The ministry has a number of planned and ongoing initiatives and business objectives in support of its goals:

- Results-based Code Initiative
- Community Forests Initiative
- Kyoto Protocol Initiative
- State of the Forest Report Initiative
- Completion of Provincial, Regional and Sub Regional plans within 5 years
- Completion of Landscape Unit Plans within 3 years
- Forest Health Initiative
- Softwood Lumber Initiative
- Forest Policy Review Implementation Initiative
- First Nations Forest Strategy
- Certification of Forest Products Initiative
- Implementation of New Small Business Forest Enterprise Strategy
- Bridge Replacement Strategy
- Strategic Management Framework Initiative
- Equity and Diversity Initiative
- Coordinated Access Management Strategy
- Feasibility of implementing area based AAC's
- Complete and implement an Interior market based log grading system
- Test a market based pricing system on the coast
- Training and Succession Planning Initiative
- Continuous Improvement Initiative

These initiatives and objectives should be the main drivers of IM/IT needs. The business needs with respect to IM/IT of these initiatives and objectives are described below.

Business Requirements, Target IM/IT Environment, and Strategies to Achieve It

The business needs of IM/IT, the IM/IT target environment required to meet these needs, and the strategies to achieve the target IM/IT environment are described in the following seven categories:

1. Electronic Service Delivery
2. Information Management
3. Applications
4. Legacy Applications
5. Security of Systems and Information
6. Infrastructure
7. Retirement of Outdated Technology or Applications

Refer to Appendix II for details of the infrastructure and technologies in the target environment.

The target IM/IT environment strives for a streamlined infrastructure that provides increased efficient interconnectivity and greater access to both infrastructure and data/information. It is important to note that the business requirements of IT will change, as business objectives vary and priorities are revised. Therefore, the target environment must be flexible to effect these changes.

1. Electronic Service Delivery

Electronic service delivery is consistent with government's InfoSmart objective of providing electronic services to citizens, businesses, and government staff via the internet.

The ministry will continue to take advantage of advances in electronic commerce capabilities. The ministry has successfully integrated web technologies into its business processes. Web publishing is widely used and well established as a communication medium within the ministry. It is expected that further growth of web publishing will continue from all business areas.

Partnerships and collaboration with various stakeholders provides opportunities to share and exchange both business data/information and applications/application development. These forms of associations have organizational, business process, and technology implications for the delivery and support of the IM/IT infrastructure. There has been a significant increase in the number of business areas wishing to pursue increased electronic interaction with their clients. Varied and flexible electronic commerce services must be available to work effectively with business partners. Ideally, these would be delivered utilizing standard components provided by government.

Business Needs

- business relationship with licensees and stakeholders is enabled through the provision of electronic services, including collaboration, direct database updates, transfer, and exchange of data. This is the normal way of conducting business. (e.g. revenue transactions, silviculture prescriptions, and forest development plans)
- most data including spatial, and information holdings are readily accessible for viewing and downloading through the internet by government staff, licensees, and citizens. Information is presented spatially to improve citizens understanding of the ministry's land-based activities.
- data, information, forms, and processes are consistent regardless of the access point (ministry or government)
- electronic delivery services are available on a continuous basis (i.e. 24 hours/day, seven days a week) but do not fully meet 100% availability
- provision of a single access option for data and information holdings that are delivered through a variety of Internet-based services. (e.g. National Forest Information System and licensees)

Target IM/IT Environment

- web servers to handle internet, intranet, and extranet demands
- applications developed or adapted to the internet to meet business requirements
- increased use of electronic forms (to retain as an electronic record or to update the database) as appropriate
- investigation and pilot/implementation of electronic payment
- ability to adapt to various data exchange formats
- replicated and shared corporate resource management data warehouse
- enhanced spatial web servers to provide internet and intranet access to spatial data

Technology Strategies

There are various levels of electronic service delivery, depending upon the degree of collaboration with citizens and business clients. At the basic level, where no collaboration is involved, the user electronically retrieves data or information (one-way transfer to user). The intermediate level involves collaboration with the business clients to enable two-way electronic data transfers. Finally, at the advanced level, collaboration results in complex and integrated solutions, such as the capability for business

clients to directly update the ministry's database.

To achieve the target electronic service delivery environment, the technology strategies include:

- upgrade web servers to keep pace with demands for electronic service delivery. This is required to maintain the basic level of electronic delivery and continual posting of data and information on the web.
- increase the use of internet-based data exchange technologies to handle increased volume (of data and clients). That is, implement electronic data exchange technologies to accommodate collaborative, secure data exchange with business partners. This will involve assessing XML as a data exchange format and using PKI. PKI authenticates that the user is who s/he said s/he is, allows for file encryption, and can authorize data entry of selective sections of a form. These technologies enable and enhance the provision of intermediate and advanced levels of electronic service delivery
- implement business-oriented electronic forms either for electronic transfer or direct updates to the database to enable intermediate or advanced electronic delivery services
- provide access to the corporate resource management data warehouse through a variety of electronic interfaces
- develop relationship between ministry IT staff and stakeholders (e.g. licencees) IT staff to assist in IT collaborations

2. Information Management

The ministry will continue to improve the integration of the vast amounts of spatial, textual, and document information. A corporate resource management data warehouse shared amongst ministries will provide ready access to a single source of clean, current information that can be used by multiple agencies for analysis and reporting. It is hoped that this will form one of a few strategic warehousing implementations for government (e.g. social, economic, health care etc).

Emphasis will be placed on converting all districts to the new INtegrated Corporate Spatial and Attribute Database (INCOSADA) standard which provides clean, GIS-ready data and a common update tool.

Tools for viewing, analysis, and reporting will continue to evolve as next generation versions become available.

Business Needs

- ministry corporate data holdings are readily available for

operational business processes and decision-making
- single point of access to multi-agency resource management data holdings
- capture of business data directly during field work
- reduced cost of data acquisition
- increased consistency and quality of corporate data
- capability to manage information in a more dynamic environment (e.g. co-operatives and utilities)
- increased use of additional types of imagery such as orthophotos and satellite
- need for temporal data (e.g. to report on data changes over time)
- information to support the sharing, routing, and tracking of documents
- improved electronic records management to meet FOI, operational, and litigation requirements
- protection of historical documents that have business relevance. These documents are one-of-a-kind which are still referenced regularly.
- share the information and data collection workload with other ministries and licensees

Target IM/IT Environment

- corporate resource management data warehouse that includes complete integration of spatial and textual data
- INCOSADA tool suite, Geomedia, and Arc/Info
- spatial web services
- continue use of data modelling tools (IEF and Oracle's Designer 2000)
- simple document management and repository tools
- records management profile attached to data or documents

Information Management and Technology Strategies

The information technology strategies are focused on the corporate resource management data warehouse, electronic document management, data modelling, and data collection and management.

Corporate Resource Management Data Warehouse
- implementing a corporate resource management data warehouse for data sharing with resource agencies such as Ministry of Environment, Lands, and Park, Aboriginal Affairs, Land Use Coordination Office, and Energy and Mines
- formalize the partnership with Ministry of Environment, Lands, and Parks to share spatial data through a corporate resource management data warehouse

- loading of Ministry of Forests and Ministry of Environment, Lands, and Parks spatial data into the corporate resource management data warehouse
- provide a single source data repository for ministry and other government ministry or agency's data
- provide a variety of tools to enable quick and easy access to this single source data repository
- complete as soon as possible the conversion of spatial data to GIS-ready format by completing INCOSADA implementation in all districts

Electronic Document Management
- implement an electronic document management system. This system will allow for the storage, retrieval, and disposal of electronic documents classified according to ARCS/ORCS requirements
- incorporate records management discipline across the management of all data types to facilitate retention/disposal and access management
- investigate alternate media to ensure preservation of historic documents currently on paper

Data Modelling
- continue data modelling – move current data models to Designer 2000 as changes are made to projects/applications and emphasize re-use of data entities

Data Collection and Management
- provide improved data collection and management processes to reduce redundant data entry, increase consistency and quality of data, and provide more effective links between applications. This includes increasing the use of remote data entry/edit devices at the field level, as part of an improved mobile office concept.
- provide tools to manage and manipulate data at the local level (i.e. region and district offices)

3. Applications

The application environment provides the application architecture or model within which business applications are delivered. In combination, the applications should support the operational business needs and the capture and management of data.

Business Needs:

Numerous applications support the operations of the ministry. While these applications are important, only those of greatest significance in terms of meeting the ministry's goals are highlighted below.

- quicker development of applications to meet new business requirements
- applications that are reliable, flexible, and easy to use
- revitalized revenue applications that are reliable and flexible to adapt to new business requirements
- a forest road management system
- an integrated forest management solution for Small Business activities that is not dependent on the regulatory and stewardship management systems of the ministry
- enhancements to enable the management, and reporting of compliance and enforcement activities
- applications that will minimize the need to physically move paper in the conduct of business (e.g. a facility for managing and conducting inter-agency referrals.)
- enhancement to spatial viewing and analysis tools to enable a greater number of staff to benefit from the capabilities of the technology and investment in data
- enhancements to the real-time tracking of resources system to provide better management and contribute to the safety of protection personnel and equipment
- enhancements to the asset management system to improve the utilization of equipment and efficient deployment
- increased staff productivity from investments in desktop tools, services, and business applications
- new capabilities to enable internal and external communication

Target IM/IT Environment

- advanced workflow services that interface with electronic mail, forms, and business applications
- enhanced or new applications that meet the needs of the business

Technology Strategies

The application development strategies to achieve the target IM/IT environment include:

Approach
- enhance, develop, or purchase applications to replace or modify existing business applications. The "modify", "build", or "buy" decision must be considered for each business applications. The applications in each of the following business areas have been targeted for renewal: revenue, roads management, Small Business, and compliance and enforcement.
- provide tools or training to increase staff productivity
- promote and increase utilization of NetMeeting to

facilitate internal and external communications

Business Applications
The ministry has a comprehensive list of business applications to support its operations. Strategies for specific applications (critical to meeting ministry's goals) are highlighted below.

- revitalize revenue applications
- develop roads management system
- enhance or develop compliance and enforcement system
- enhance applications such as Silviculture Prescriptions and FDP to include an electronic data transfer component
- enhancement of Protection program's real-time resource tracking system. Enhancements would include investigation of satellite communications.
- obtain an integrated forest management system for Small Business
- provide enhanced spatial viewing and analysis tools
- applications will also be developed or purchased to enable the ministry to take advantage of opportunities inherent in our IM/IT environment. For example, applications that minimize the use and movement of paper media.
- integrate electronic information management tools with workflow. For example, implement workflow embedded electronic forms and email. The value of electronic forms is increased with automatic routing to appropriate staff for review, edit or update of the database
- continue web-based development of applications to access corporate database

4. Legacy Applications

The ministry has many legacy systems that support core business functions. The ministry must address the long-term future of older applications. The migration options include porting to a new environment, re-engineering, developing new applications, or retiring component(s). The proposed Harvest Billing System initiative will address the remaining IBM MVS systems.

Business Needs

The business requirements for legacy applications include:

- identification and elimination of any systems or sub-systems that no longer meet essential business needs
- avoidance of the inevitable rapid increase in the operation costs associated with IBM VM applications, and the ongoing complexity and staff costs associated

with maintaining two corporate database platforms (IBM DB2 and Oracle)

- elimination of impending risk to business as a result of reduced availability of legacy technology skills (e.g. CSP)
- migration of legacy applications to take advantage of the features and functionality of internet-based technologies
- increase accessibility of legacy data and provide the capability to link spatial data with legacy data
- evolve current applications such as Forest Tenure Administration System, Integrated Silviculture Information System, and Enforcement Review & Appeal to only contain functionality associated with regulatory and stewardship requirements. A separate integrated management system should be obtained to address the business requirements of the Small Business program
- replacement of the accounts receivable system with functionality contained in CAS Oracle Financials package
- migration of the client management system towards anticipated government direction for common business registration and identification

Target IM/IT Environment

- use of DB2 database to support legacy systems until legacy applications have been migrated
- use of Oracle database as replacement database for legacy systems and as the transitional reporting database for legacy data.
- other technologies may be introduced to assist with transition (e.g. VisualAge)

Technology Strategies

The ministry must improve business practises by revising and migrating legacy components or systems to better meet current regulatory, revenue, stewardship, and enforcement roles. This, also includes a determination if these legacy systems or subsystems are meeting business needs.

At this time, the migration strategy of legacy applications is under discussion. The tentative alternatives are:

1. Move from Legacy to New Implementation. With this approach, the implementation of the new application will force retirement of the legacy application at a single point in time. The VM SQL/DS database will be migrated to an Oracle database and the new application will execute against this Oracle database. The new

application is developed using one of the following three alternatives:

(i) "convert" legacy applications (programming language to be determined)
(ii) "redesign" a new system to replace the legacy application (programming language to be determined)
(iii) implement the CSP migration path proposed by IBM. Namely, convert the legacy application using VisualAge Generator to a combination of Java and C++ or Cobol, and at a later date, "convert" or "redesign" to Java.

"Redesign" of legacy applications will likely incorporate required business functionality not present in the legacy application.

2. Phased Implementation
With the phased implementation approach, the functionality inherent in the legacy application is retired over time. Initially, the reporting functionality in the legacy application is implemented as a web-based application with the "remaining" functionality being executed by the legacy application. At the same time, the VM SQL/DS database is replicated to Oracle. This results in the reporting functionality being handled by the web-based Oracle application and the legacy SQL/DS application executing the non-reporting functionality. Over time, as the web-based application is enhanced with additional functionality, the legacy application will be used for fewer functions. When all features (as appropriate) in the legacy application have been incorporated into the web-based application, the legacy application is retired. At which time, the VM SQL/DS database for this application will also be retired. The design of the web-based application will take into account required business functionality not found in the legacy application such as spatial and document linkages.

This migration strategy will be reviewed for all legacy systems. The migration of legacy systems is targeted for completion by the end of the 2003/04 fiscal year.

5. Security of Systems and Information

Business Needs

- maintain and enhance security of the current computing environments to mitigate increased risk
- improve staff awareness of the risks associated with their use of government IM/IT facilities
- capability to secure electronic transactions for transfer

of data and documents if required (e.g. silviculture prescriptions, and forest development plans)

- improved procedures for conducting investigations and the availability of information to support investigations
- a security tracking system for non-VM applications.

Target IM/IT Environment

- secure, authenticated electronic data transfer with business partners
- authentication mechanisms (e.g. smartcards)
- Security Identification Tracking (SIT) replacement for non-VM applications
- anti-virus software
- intrusion detection products
- network security services provided by ITSD
- PKI technology for encryption, authentication, and electronic signature

Technology Strategies

The technology strategies with respect to the security of systems, data, and information include:

- investigate authentication mechanism such as smart cards as another option for user authentication
- upgrade anti-virus software
- investigate intrusion detection devices
- network security services provided by ITSD
- implement PKI as needed
- investigate and implement SIT replacement. SIT is used to add, modify, and track user ids for access to resources and applications on the ministry's VM and IBM/MVS systems.

6. Infrastructure

Information Technology Requirements

- maintain the client-server and mainframe development environments to support existing applications
- environment to provide scaleable, centralized application operation including web-based services
- a responsive application development environment for web–based applications
- reduction in the ministry's cost for supporting the desktop and servers
- increase data storage capacity and provide data management utilities. This is driven primarily, by the need to manage new data types (e.g. orthophoto and satellite) at both the corporate and local level (e.g.

region and district office)

- provide infrastructure (e.g. storage, management, and access) to support temporal data
- define and implement data management model for data repository
- provide real-time data communication with field staff in specific circumstances (e.g. personnel in the fire area)
- increase the speed of electronic transfer/access to handle increased capacity and productivity
- upgrade the ministry radio network to comply with Industry Canada regulations
- enhance support center tools and integrate with other service providers (e.g. ITSD)
- compliance with government server, desktop, and networking standards

Target IM/IT Environment

- web-based application development environment
- Windows NT Terminal Server development environment for centralized application delivery
- client/server application development environment
- mainframe application development environment to support legacy applications
- test and production environments
- ethernet-based LAN
- upgraded desktop, LANs, and network
- spatial web server (Arc/IMS)
- shared corporate resource management data warehouse (SDE-Oracle)
- system and network management tools for inventory, software distribution and desktop management purposes (e.g. Microsoft System Management Server)
- renewed Oracle database service to meet more demanding requirements
- radio network that will operate at a new radio frequency
- mobile computing infrastructure including expanded use of remote data entry/edit devices for mobile computing
- use of satellite data communication, if appropriate
- use of Remedy, a support center tool

Technology Strategies

The following strategies enable the ministry to provide an efficient infrastructure to service the ministry's business needs. As well, business application developments and implementation is dependent upon the presence of the IM/IT environment.

- enhance the e-business platform comprised of web servers for inter-, intra-, and extra-net usage, a web development environment for building web-based

applications and a spatial web server for internet access to spatial data. This would include:

- enhancing the web-based application development environment to support web-based applications (e.g. refine application development standards and guidelines and implement selected middleware)
- continuing enhancement of Windows NT Terminal Server environment to provide centralized application delivery
- enhancing or adding application and web servers to host line of business applications utilizing Windows NT Terminal Server technology
- production deployment of ESRI SDE-Oracle and ARC/IMS

- maintain and upgrade desktops, LANs, and network; desktops and servers are upgraded according to the lifecycle management plan
- enhanced network, initially to major centres
- replace remaining token ring LANs with ethernet
- enhanced storage and backup subsystems to handle increased storage needs and management at the both the corporate and local level
- upgrade, add to, or replace centralized computer systems to meet increasing demands for computing power and capacity. As well, implement software to assist in system or network management.
- upgrade radio network to comply with Industry Canada regulation (compliance is to be completed in two phases, 2004 and 2010)
- provide a mobile computing infrastructure--evaluate handheld data entry devices and investigate satellite-based communication networks

7. Retirement of Outdated Technology or Applications

Technology and applications have limited life spans. Using outdated technology will likely increase the cost of operation (e.g. high support cost and business risk due to scarcity of experts) to the ministry. Similarly, outdated applications due to major changes in the business process (e.g. policy changes) will likely result in higher maintenance costs relative to the cost of developing a new application. As a result, both outdated technology and applications hinder the efficiency and effectiveness of the ministry's operations and hence fulfilment of its strategic goals. The solution is to either retire outdated technology or applications or to migrate these legacy applications.

Technology strategies to retire outdated technology or applications include:

- commence conversion of legacy applications to Windows NT Terminal Server or Web environment
- retire client server applications or host on Windows NT Terminal Server platform
- continue implementation of the workstation strategy. A planned upgrade/replacement of workstations ensures that computing power on the desktop is sufficient and effective for productivity.
- continue implementation of the Printer And Plotter Strategy so that printers and plotters will be upgraded/replaced at the appropriate time
- introduce a sustainable multi-year plan for all software with funding commitments

Part V — Budget and statistics

Note: The object of this section is to provide basic figures in a standard format that can be rolled up into government wide spreadsheets for government-wide analysis and to set targets for subsequent reviews. Major indicators of change will be presented back to ministries and ACIM by ISTA. Figures should be presented in a Web form or spreadsheet. For clarity, budget figures may be tied to major ministry initiatives.

Ministry Totals

STATS	CURRENT YEAR		NEXT YEAR	
	FTEs	$$	FTEs	$$
Total Ministry	4 ,503[1]			
Number of staff in IT-related positions: • Management (estimate) • ISL positions (union) • Total	 76 160 236	 7,191,100		
Contracted Services		7,200,000		

[1]FTE allocated for fiscal year 2000/01, includes 232 allocated for Forest Renewal and Science Council of BC, 130 dedicated for fire suppression, and allocations for mitigated staff

Capital and Operating Costs

The following tables provide an overview of the short term and long term capital and operating costs and the major projects involved in driving those costs. The tables reflect the funding pressures that would occur. The Ministry is currently working through a performance planning budget process that will identify funding requirements and how they will be dealt with. The tables will be updated once decisions on budget issues have been made.

The capital costs show an increase in the next two years and then a decline in the third year. The increases result from the following:

- Workstation management – replacement of leased workstations with purchased ones. The increase reflects the effect of replacing all the machines that are now coming off lease. After the leased machines have been replaced there will be a reduction to the steady state cost of replacing the machines on a 3/5 year cycle (3 years for high end workstations and 5 years for the rest). This will occur in the third year of the plan.
- Server replacement will be required as the servers come off lease and the ministry adopts a replacement purchase strategy.
- The Windows 2000 implementation will require licensing upgrade fees for the entire ministry.
- The Harvest Billing System is a major investment for the ministry and will increase the amount of application development capital required.

CAPITAL COSTS

Capital Costs	2000/01	2001/02	2002/03	2003/04
Workstation Management	3,190,000	3,558,000	2,155,000	2,155,000
Server Replacement	0	414,000	966,000	138,000
Windows 2000 implementation	0	0	2,270,000	50,000
Printer/plotter Management	1,001,000	1,016,000	1,062,000	1,125,000
Harvest Billing System	634,000	1,993,000	1,906,000	570,000
Under $1Million	4,773,000	4,773,000	4,773,000	4,773,000
Sub-total	**9,598,000**	**11,754,000**	**13,132,000**	**8,811,000**
Protection program	220,000	420,000	420,000	420,000
Small Business Program	1,004,000	899,000	826,000	470,000
Total	**10,822,000**	**13,073,000**	**14,378,000**	**9,701,000**

The operating costs will increase over the period primarily due to expected increases in the costs for VM processing and radio licensing. There are also some increases expected due to increased training and data conversion associated with new development projects.

OPERATING COSTS

MOF OPERATING	2000/01	2001/02	2002/03	2003/04
New Systems Maintenance	701,345	701,345	701,345	701,345
Telecommunications Services	226,000	226,000	226,000	226,000
Training	726,080	726,080	726,080	726,080
VM Processor	3,166,817	3,666,817	3,866,817	3,866,817
Exchange Maintenance	722,746	722,746	722,746	722,746
Data Networks	1,640,492	1,920,000	1,920,000	1,920,000
Voice Base	3,561,652	3,561,652	3,561,652	3,561,652
Corporate Radio Licensing	435,000	435,000	435,000	735,000
Other operating costs	3,311,574	3,918,574	3,738,574	3,274,574
Region/branch operating (stob63)	3,146,689	3,146,689	3,146,689	3,146,689
TOTAL MINISTRY (excluding salaries)	**17,638,395**	**19,024,903**	**19,044,903**	**18,880,903**

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The glossary was compiled using the following references:
(1) http://www.matisse.net/files/glossary.html
(2) http://www.for.gov.bc.ca/isb/datadmin/glossary.htm
(3) http://www.whatis.com/

GLOSSARY

Application Development Environment (ADE) (2)

All tools and techniques used by an organization to deliver information systems. Technology, standards, and related considerations that pertain to application development, excluding the utilities, software services, operating system, network, and hardware platform. Examples include a repository; standard 3GLs or 4GLs; and system environments for development, test, and production.

Application Server (3)

An application server is a server program in a computer in a distributed network that provides the business logic for an application program.

Authentication (3)

Authentication is the process of determining whether someone or something is, in fact, who or what it is declared to be. In private and public computer networks (including the Internet), authentication is commonly done through the use of logon passwords.

B2B (3)

On the Internet, B2B (business-to-business), also known as e-biz, is the exchange of products, services, or information between businesses rather than between businesses and consumers.

Client/Server (2)

"An application of co-operative processing in which the end-user interaction with the computing environment is through a programmable workstation that executes some portion of the application (beyond terminal emulation)."
"An architecture of co-operative processing with predefined roles for two types of components, clients and servers. The client is the driving or initiating component, typically on a workstation, delegating predefined types of tasks to a responding component satisfying the request, the server, for which it usually awaits a response. The server acts on behalf of a client for a predefined class of functions, e.g., database requests."

e-Business (3)

e-business (electronic business), derived from such terms as "e-mail" and "e-commerce," is the conduct of business on the Internet, not only buying and selling but also servicing customers and collaborating with business partners.

Database (2)

A repository of database tables that has built-in management for inserting, updating, and deleting elements of any one table, and for maintaining table integrity.

Extranet (3)

An extranet is a private network that uses the Internet protocol and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers, or other businesses. An extranet can be viewed as part of a company's intranet that is extended to users outside the company.

FDDI (1)

(Fiber Distributed Data Interface) -- A standard for transmitting data on optical fiber cables at a rate of around 100,000,000 bits-per-second (10 times as fast as *Ethernet*, about twice as fast as *T-3*).

Internet (3)

The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers).

Today, the Internet is a public, cooperative, and self-sustaining facility accessible to hundreds of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically, what distinguishes the Internet is its use of a set of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol). Two recent adaptations of Internet technology, the intranet and the extranet, also make use of the TCP/IP protocol.

Intranet (1)

A private *network* inside a company or organization that uses the same kinds of software that you would find on the public *Internet*, but that is only for internal use.

Java (3)

Java is a programming language expressly designed for use in the distributed environment of the Internet. It was designed to have the "look and feel" of the C++ language, but it is simpler to use than C++ and enforces a completely view of programming. Java can be used to create complete applications that may run on a single computer or be distributed among servers and clients in a network. It can also be used to build small application modules or applet for use as part of a Web page. Applets make it possible for a Web page user to interact with the page.

Legacy Application (3)

In information technology, legacy applications and data are those that have been inherited from languages, platforms, and techniques earlier than current technology. Most enterprise who use computers have legacy applications and databases that serve critical business needs. Typically, the challenge is to keep the legacy application running while converting it to newer, more efficient code that makes use of new technology and programmer skills.

Local Area Network (LAN) (2)

Two or more computing units connected for local resource sharing. A network in which communications are limited to a moderate-sized geographic area, such as a single office building, warehouse, or campus, and that do not extend across public rights-of-way.

Public Key Infrastructure (3)

A PKI (public key infrastructure) enables users of a basically unsecure public network such as the Internet to securely and privately exchange data and money through the use of a public and a private cryptographic key pair that is obtained and shared through a trusted authority. The public key infrastructure provides for digital certificate that can identify individuals or organizations and directory services that can store and, when necessary, revoke them.

Storage Area Network (3)

A storage area network (SAN) is a high-speed special-purpose network (or subnetwork) that interconnects different kinds of data storage devices with associated data server on behalf of a larger network of users. Typically, a storage area network is part of the overall network of computing resources for an enterprise.

Token Ring (3)

A Token ring network is a local area network () in which all computers are connected in a ring or star topology and a binary digit or token-passing scheme is used in order to prevent the collision of data between two computers that want to send messages at the same time. The token ring protocol is the second most widely-used protocol on local area networks after Ethernet. The IBM Token Ring protocol led to a standard version, specified as IEEE 802.5. Both protocols are used and are very similar. The IEEE 802.5 token ring technology provides for data transfer rates of either 4 or 16 megabits per second.

Web Server (3)

A Web server is a program that, using the client/server model and the World Wide Web's Hypertext Transfer Protocol (Hypertext Transfer Protocol), serves the files that form Web pages to Web users (whose computers contain HTTP clients that forward their requests). Every computer on the Internet that contains a Web site must have a Web server program.

XML (3)

XML (Extensible Markup Language) is a flexible way to create common information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere. For example, computer makers might agree on a standard or common way to describe the information about a computer product (processor speed, memory size, and so forth) and then describe the product information format with XML. Such a standard way of describing data would enable a user to send an intelligent agent (a program) to each computer maker's Web site, gather data, and then make a valid comparison. XML can be used by any individual or group of individuals or companies that wants to share information in a consistent way.

Currently, a formal recommendation from the World Wide Web Consortium (W3C). XML is similar to the language of today's Web pages, HTML. Both XML and HTML contain markup symbols to describe the contents of a page or file. HTML, however, describes the content of a Web page (mainly text and graphic images) only in terms of how it is to be displayed and interacted with. For example, a <P> starts a new paragraph. XML describes the content in terms of what data is being described.

APPENDIX I - Current Information Management and Technology Environment

The current information management and technology environment is described in terms of the following categories: network architecture, data architecture, data modelling, electronic data interchange, information architecture, application development architecture, and training and support.

Network Architecture

LAN

The ministry has 81 Local Area Network (LANs) comprised of 4,346 NT workstations, 91 servers, and one cluster of two servers. Eighty-one percent (3,504/4,346) of the ministry's workstations are Pentium 200 or better. Table 1 shows the number of desktops and notebooks according to processor level. The LAN servers (running NT4 sp3 or sp5) provide file and print services. Many of the LANs are geographically dispersed throughout the province in Regional and District offices. The cluster of two servers (using Microsoft Cluster Server software) service headquarter branches.

Table 1.   Number of Desktop and Laptops (May 2000)

Processor	Number of Desktop	Number of Notebook	Total
Pentium 200 or better	3,237	267	3,504
Less than Pentium 200	597	245	842
Total	3,834	512	4,346

The network, also includes:

- a Storage Area Network (SAN). The SAN contains 600GB disk space and is connected to 2 (soon to be 3) servers. The SAN houses spatial data for the DSC initiative.
- four Microsoft Internet Information Server (IIS). The ministry hosts seven websites (e.g. intranet, extranet, and Forest Practices Board) and two FTP sites. Current plans include installing an additional two IIS to host Java servlet services. In 1999, there were more than six million hits to the ministry's web servers from 10-12,000 unique users per week.
- two Windows NT Terminal Servers hosting Arc/Info software
- two Oasis print servers

- four Unix server systems
- two Microsoft NT 3270 Gateway servers
- two VAX network servers (retirement as planned is imminent)
- various peripheral equipment, and
- network-attached VM and MVS platforms.

Topology

The ministry uses the BC government's Information Technology and Services Division (ITSD) shared enterprise network to provide WAN connections to the Regional and District offices. Two LAN topologies are currently in use: (i) legacy 4megabit Token Ring on IBM Central Access Units (CAUs) and Lobe Access Modules (LAMs) or Proteon Multi Access Units (MAUs); and (ii) 10/100 Ethernet on Nortel Ethernet switches. The ministry is currently converting from token ring to ethernet. TCP/IP is the protocol used on all topologies and interconnectivity among the various platforms.

All ministry offices are connected with T1 lines (1.544 mbps) with the exception of one office at 128 kbps, and three offices with satellite links clocked at 56 kbps. The Victoria MAN (Municipal Area Network) is running FDDI (fiber distributed data interface) at 100 mps supporting both Token Ring and Ethernet protocols. Headquarter offices and buildings are interconnected using the ministry's own fiber cable. All connections are routed through a single MAN access at 595 Pandora Ave. using ministry-owned routers.

Backup

The servers are backed up using the NT backup utility onto digital linear tape (DLT).

Radio Network

The ministry operates, manages and maintains the largest government radio system in Canada. It includes more than 320 mountain top repeaters, approximately 500 base stations, 6000-7000 pieces of wireless and radio communications equipment, weather stations, an aircraft (resource) tracking system and a variety of other unique wireless and radio communication systems (e.g. wireless alarm system).

The radio network is primarily used for the fire protection, compliance and enforcement programs, and for the safety of field staff as per Workers Compensation Board requirements.

Data Architecture

The ministry's corporate data resides primarily on DB2/VM with some on MVS, and Oracle. Database updates are made directly to these databases. However, access to corporate data for reporting purposes is available through three methods. With the first method, reports are generated from DB2/VM. The second method, reflecting the ministry's strategic direction is through the Oracle database, as all corporate data from DB2/VM is replicated to Oracle. The third method of access, a tactical approach is via Microsoft Access tables, as DB2/VM corporate data is extracted and subset to Microsoft Access tables.

The ministry (and BC government) database standard for both the enterprise and workgroup is Oracle. The ministry maintains use of DB2/VM database to support numerous legacy applications. Microsoft Access is the ministry's standard database for one-of-a-kind, standalone, single-user purposes.

The total size of the databases (DB2 and Oracle) is approximately 58GB. At peak demands, the databases process 60,000 transactions/hour.

Spatial data and associated attribute data are stored as files in a repository (IODM).

Data Modelling

Standard modelling tools are the Information Engineering Facility (IEF) and Oracle's Designer 2000. Textual model details are copied into one of three "data dictionaries" for browsing by ministry staff:

- IDD (Integrated Data Dictionary) — stores information about systems built within the corporate relational databases
- ISDD (Integrated Spatial Data Dictionary) — stores information about spatial data used in the ministry ("spatial" means data including information about where it resides geographically on the earth's surface)
- EDD (Extended Data Dictionary) — stores modelling information published by any ministry staff member for databases developed for local use

Electronic Commerce

The ministry currently uses web-based technologies and

EDI to provide electronic commerce business solutions. The ministry's MLSEDT application enables licensees to submit obligation data via the internet. As well, the ministry uses the formal system of electronic data interchange (EDI). Currently, the ministry uses EDI to receive summary scale data from 19 forestry companies (accounting for 57% of all timber harvested in the province) and electronically transmit stumpage invoices to 13 forest companies.

Information Architecture

The disciplines of:

- data management (designing and managing organized data)
- information management (design and promote the management of data as a strategic resource)
- records management (systematic control of information that forms time-based recorded evidence), and
- library/archival science (managing library of collected knowledge such as reports)

are important in viewing the information architecture. The disciplines of data management is focused on data, information management acts on information, and records management works with records. These "data types" can be thought of as hierarchical and are described as follows:

- Data = facts that require processing and interpretation before becoming meaningful. E.g. color="red", vehicle ID="VVV 123", name="Smith"
- Information = knowledge content or meaning that results from relating data and/or other isolated facts, within a given context. E.g. "Smith's car is red"
- Records = data / information / documents providing evidence of a business function / activity / transaction. E.g. "Notice of license renewal issued from Victoria office under authority of Superintendent of Motor Vehicles on a certain date."

The second component of an information architecture is "data format". The "data formats" are text, tabular, spatial, and other (which includes images). Figure 1 highlights for each information discipline, the body of knowledge and availability of marketplace tools to accommodate the format in which data is collected, viewed, or queried. The height of the horizontal bar indicates the degree of understanding and practice (e.g. body of knowledge, availability of tools, and established standards) in a discipline. For example, the Record Management

discipline is well understood by industry and there are available tools for "Text" but minimal body of knowledge and tools for "Tabular", "Spatial", and "Other" data formats. The length of the horizontal bar indicates the extent to which each discipline has addressed all aspects of each data format. For example, the data management discipline has addressed all aspects of managing tabular data, but has not addressed some aspects such as temporal data in the management of spatial data.

The ministry's data management tools include the following database administrator tools: Oracle Enterprise Manager and SQLPlus, DB2/VM tools, and DB2Reorg

The ministry's electronic information management tools and technologies include:

- individual productivity tools (Microsoft Office 97),
- electronic mail (Microsoft Outlook 98),
- reporting (Oracle Reports and CrystalReports)
- e-form products (Shana and Acrobat)
- internet, intranet, extranet (Internet Explorer 4), and
- File Transfer Protocol (FTP) services.

The ministry's electronic records management tools include:

- Quartech Records Management System (for management of Arc and Orcs documents)
- Alchemy (limited to management of scanned documents for litigation purposes).

The ministry has a multiplicity of business applications. Currently, there are 97 mainframe (VM and MVS) applications, 36 Web-based applications, and 13 Client/Server (Delphi) applications of varying degrees of complexity.

Security

ITSD has the lead role in investigation of security tools. Security functions employed include:

- NT authentication
- virus detection (desktop and server)
- authorization mechanisms. Security Identification Tracking (SIT) tracks user information, user ids, and access on the mainframe platforms.
- auditing (e.g. transactions and access to systems)
- Public Key Infrastructure (PKI) certificates as required by the business area, and
- network security mechanisms (e.g. IP filtering and port blocking) performed by ITSD

Application Development Architecture

The ministry has three application development environments to support line-of-business application developments. The first is a mainframe application development environment based on PL/1, Cobol, and CSP to maintain existing legacy mainframe applications. The second environment is based on a client/server model implemented with Delphi, SQL/Net, Oracle database and ODBC to support distributed applications. Lastly, the Web development environment, based on a web-publishing model is implemented with Active Server Pages (ASP), Common Gateway Interface (CGI), Perl, and Javascript.

The ministry maintains both a test and production environment for all platforms. For example, implementation of a servlet engine would mean implementing two identical platforms; one for testing purposes and the other for production use.

In 1999, one thousand, two hundred software modules were migrated into production.

Fig. 1. Tool Availability and Information Disciplines Acting on Data
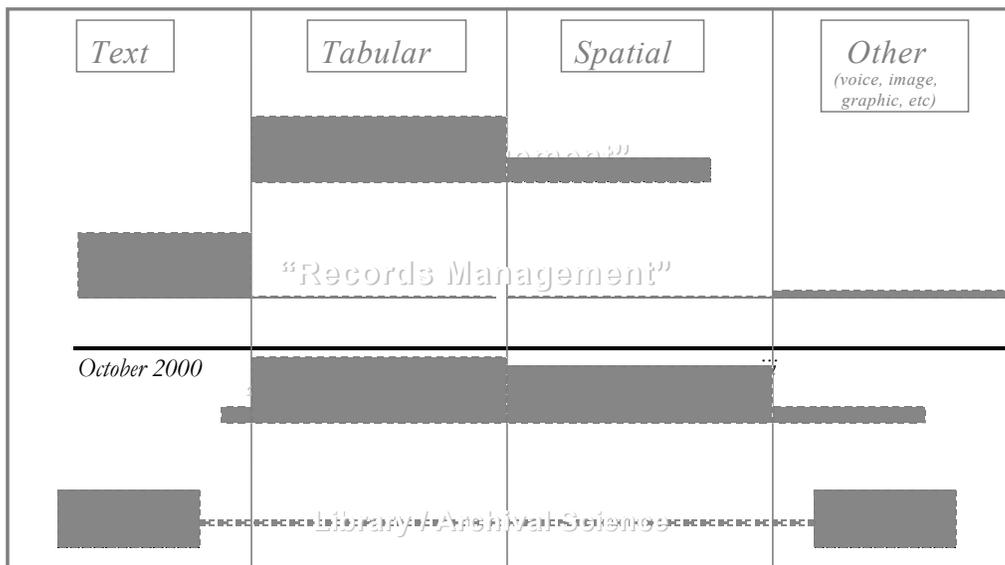
Training And Support

The Remedy system is the ministry's first step into automated knowledge management systems. Remedy is used to track and obtain statistics on call alerts for business and technology problems. The Ministry maintains a Technology Support Centre to deal with hardware and generic office software problems and a Business Application Support Section to deal with business specific application issues.

APPENDIX II - Target Information Management and Technology Environment

Network Architecture

- NT (Win2000) workstations and servers
- ethernet LANs (NT)
- token-ring LANs (NT)
- Asychronous Transfer Mode (ATM)-based WAN
- SAN
- Unix Servers
- Microsoft NT 3270 Gateway servers
- application servers
- web server (internet, intranet, extranet) – Microsoft IIS
- spatial web server (ARC/IMS)
- Windows NT Terminal Servers
- Oasis print servers
- FTP services
- centralized tape backup system
- tape backup system for regional and district offices
- system and network management tools for inventory, software distribution, and remote desktop management
- limited use of satellite data communication for protection activities

Radio Network

- narrowbanding of the radio spectrum currently licenced to the ministry
- spectrum redeployment as part of a government-wide initiative

Data Architecture

- Oracle
- DB2
- SDE-Oracle as the spatial database management system

Data Modelling

- data modelling tools (IEF and Oracle's Designer 2000)
- re-use of data entities

Electronic Commerce

- implement EDI alternatives
- assess XML as a data exchange format

Information Architecture

- office productivity tools
- electronic forms (Shana, Acrobat, ITSD-issued RFP to select e-form package)
- document management and repository tools
- workflow tools (as provided by ITSD)
- spatial analysis tools

Security

- authentication mechanisms (e.g. smartcards)
- SIT replacement
- anti-virus software
- PKI technology for encryption, authentication, and electronic signature
- intrusion detection products

Application Development Architecture

- web application development environment (ASP, CGI, Perl, Javascript, Java Server Page (JSP), and Java Servlets)
- Windows NT Terminal Server development environment
- client/server application development environment
- mainframe application development environment

Training And Support

- Remedy enhancement