Intellectual Property Management

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Environment Canada Environnement Canada

Canada

Report Clearance Steps

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Acronyms used in the report

AAFC	Agriculture and Agri-Food Canada
ADM	Assistant Deputy Minister
CEPA	Canadian Environmental Protection Act
CFIA	The Canadian Food Inspection Agency
EC	Environment Canada
FPTT	Federal Partners in Technology Transfer
GoC	Government of Canada
IP	Intellectual Property
IPM	Intellectual Property Management
IPO	Intellectual Property Office
MAP™	Microwave Assisted Processes
NRC	National Research Council
NRCan	Natural Resources Canada
NGO(s)	Non-Governmental Organization(s)
OGD	Other Government Departments
OPP	Outcome Project Plan
POSS	Precipitation Occurrence Sensor System
PSIA	Public Servants Inventions Act
S&T	Science and Technology
SBDA(s)	Science-based Departments and Agency(ies)

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Report Prepared by the Evaluation Division, Audit and Evaluation Branch and TDV Global Inc.

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EXECUTIVE SUMMARY

An evaluation of Environment Canada's (EC) Intellectual Property (IP) management policies and practices was identified in the 2004/05 to 2006/07 Department Audit and Evaluation Plan. The purpose of the evaluation was to assess EC's Intellectual Property policies and practices over the 1992 to March 2006 period. Three issues are addressed:

1) **Relevance:** the extent to which EC's IP policies, processes and institutional arrangements support the role, responsibilities and priorities of EC, as well as federal government policies, acts and strategies related to IP;

2) **Effectiveness:** the extent to which intellectual property is protected, transferred and commercialized by EC, including consideration of secondary and unintended results;

3) **Efficiency:** the adequacy and appropriateness of the use of resources and institutional arrangements behind IP management.

The evaluation examined IP related to computer software and technologies and considered comparative experiences of other science-based departments and agencies (SBDAs).

Information was collected from pertinent documents and files, interviews with twenty-six employees from EC and five employees from other SBDAs, three case studies representing examples where IP was protected and commercialised and where IP was not protected, and the responses of three hundred and fifty EC employees to an in-house survey.

Findings

Evaluation Issue: Relevance

EC's policies, processes and institutional arrangements support broad Government of Canada policies and requirements. They do not, however, provide strategic corporate direction to ensure that EC's IP relates to the Department's mandate, goals and priorities. EC's policies lack specific guidance to help Delegated Authorities determine whether and when to transfer technology; whether or not to charge for IP; how and when EC can reduce its internal investments into licensed IP rights; and what to do in a situation where EC cannot easily divest its IP rights. Despite the existence of EC's IP Policy and a Policy on Revenue and Collaborative Arrangements, there is no agreement among EC staff, particularly among senior managers, regarding the intent and objectives of IP management within the Department.

Further, EC's management of IP does not ensure that IP rights are considered early in the science management, regulatory and policy processes. To date, EC's management activities consist of attempts to protect and license IP in a rather happenstance manner, based on the experience of individual scientists and their ability to recognize and exploit opportunities once a technology or software has been developed.

Under EC's new results management structure, the IPO functionally reports to the Environmental Protection Board but from a line reporting perspective, the IPO reports to Assets, Contracting and Environmental Management, Finance and Corporate Branch. EC's

IP policies, processes and institutional arrangements will need to align the interests of science-based and operational programs with interests to manage IP as a corporate asset.

Evaluation Issue: Effectiveness

The Department does not have a complete corporate picture of its IP. The IPO monitors and catalogues licensing agreements (e.g., royalties generated) but EC does not formally track its non-licensed IP. Further, EC does not have a systematic framework to identify and report on the environmental, economic and social results of EC's IP and how it benefits the Department and the Canadian public.

The effectiveness of EC's management of IP is hampered by a lack of corporate strategy and performance monitoring and reporting. EC does not have mechanisms in place to identify IP rights and considerations at the onset of the research and development / scientific process. Typically, EC's IP management activities are typically triggered late in the Science and Technology (S&T) process, e.g., when a scientist recognizes that there might be value in protecting a certain technology. Although EC has one of the largest S&T budgets and number of staff within the federal government, it generates only one or two official invention disclosures per year, about the lowest of all SBDAs, which suggests that all inventions may not be identified as such.

EC's IP that is identified and related to licenses and patents is protected to a degree commensurate with the risk but EC does not address the full spectrum of IP activities. EC's IP activities only partially address IP arising from S & T activities. Important IP management functions, such as the identification of IP, technology assessment, partner evaluation, negotiation of agreements (including collaboration agreements), marketing, surveillance of protected IP with regards to infringement, and gathering and analysis of competitive technology intelligence becomes the responsibility of scientists and managers. Gaps in EC's IP management functions and the lack of systematic processes create vulnerabilities and may lead to situations where opportunities for EC to achieve benefits may not be recognized and thus lost.

Potential scenarios include:

- Without due attention to the wording of agreements, EC could a) restrict the future use of IP arising from collaborations or from IP that has been provided to a licensee or b) obligate itself to ongoing support of transferred technologies (e.g., updates, continued research).
- EC may use IP owned by others in its research efforts without the license to do so and thus expose itself to litigation. Particularly damaging would be a scenario where EC used IP in the development of a piece of software or a technology that it then licenses to external parties without first obtaining the rights to do so. Such scenarios could easily happen in the context of open source software.
- Partners may not fulfill their obligations within the context of agreements.

Evaluation Issue: Efficiency

EC's IP decisions are taken by individual managers who have been delegated the authority to develop and use EC's IP on behalf of the Minister. In the absence of strategic corporate direction, decision-making takes place at the individual managerial level resulting in

inconsistent practices across the Department. Often the managers are not trained in IP management and make decisions based on their own experience with limited awareness or involvement of the Intellectual Property Office. Many Delegated Authorities have expressed concern about their lack of expertise and often defer to the inventors for key decisions.

IPO costs are only a subset of IP management costs. Many direct and hidden costs are borne by research groups within the Department. Additional costs arise from the broad range of activities conducted by scientists and managers, and their consultations with external patent agents and Department of Justice lawyers. Moreover, additional potential costs may be a deterrent to effective and appropriate IP management.

The current level of funding for IP management does not allow EC to systematically manage IP towards anticipated benefits. If IP is to be managed at the onset rather than at the end of the scientific process, and if the Department decides to widen the scope and activities for IP management, resource requirements for IP management can be expected to rise in the future.

Lessons Learned from Comparative Experiences of other Science-based Departments and Agencies

EC is addressing issues common to most science-based departments and agencies. The alignment of technology and knowledge transfer activities with mandates other that those related to activities in support of the Canadian private sector continues to be a challenge for other science-based departments and agencies. More and more, SBDAs are looking to collaborative models to leverage their IP. Some SBDAs use a combination of centralized and decentralized IP staff.

Conclusions

While EC's IP management is consistent with Government of Canada requirements, the lack of a corporate strategy and gaps in EC's IP management functions creates vulnerabilities. The absence of a corporate strategy, supporting governance structures and tools means that decisions are made on the basis of the experience and views of individual managers. The contribution of IP to regulatory and policy outcomes is typically not identified in advance nor leveraged. Technology market scanning activities and development of IP strategies are not generally carried out in the Department.

Funding constraints and expectations of increased accountability within the federal government, trends towards collaborative S &T efforts, increased IP litigation, easier access to information on technologies and data sources through the internet, and heightened awareness of and expertise in IP management in the S&T community requires a more proactive approach towards IP management. Opportunities do exist to improve the current situation; scientists and managers agree on the need for a corporate strategy and guidelines, as well as for the increased involvement of IP experts.

Recommendations

The following recommendations are offered to assist EC in managing risks and leveraging opportunities related to Intellectual Property management.

1. Departmental Management Services Board, in collaboration with the Assistant Deputy Minister of Science and Technology Branch, should establish a corporate Intellectual Property management strategy.

2. DMS Board should a) develop governance structures, mechanisms and processes to guide the implementation of the corporate IP management strategy, b) clarify IP management roles and responsibilities of the Intellectual Property Office, Legal Services, embedded IP specialists, Delegated Authorities and EC employees, particularly scientists and researchers, and c) identify funding support to be provided to IPO, embedded IP specialists and EC employees to manage EC's IP.

3. The Intellectual Property Office should a) develop supporting materials for Delegated Authorities, b) deliver a mandatory training program for all Delegated Authorities, and c) inform EC employees of the responsibilities of public servants to manage Intellectual Property and services of the IPO.

Management Response

Recommendation 1

Agree. The Departmental Management Services Board, through an ADM Steering Committee comprised of the ADMs of Finance and Corporate Branch, Science and Technology Branch, Meteorological Services of Canada and the Chief Information Officer, will direct the development, approval and communication of a corporate Intellectual Property Management Strategy (beginning in summer 2006). This Strategy direction will establish a direct link between the mandatory Government of Canada's regulatory and policy obligations for diligent management of IP assets to the need for strategic management of IP with respect to the Department's mandate, mission and priorities. The IP Management Strategy will apply to all aspects of IP e.g., not just those studied under the Evaluation.

Recommendation 2

Agree. The ADM Steering Committee will establish and empower a Review Board (Fall 2006) which will oversee the development, approval and implementation of measures that will provide the Department with a strategically aligned Intellectual Property Management Framework that updates: decision making criteria and processes; organizational modeling/positioning; funding mechanisms; and accountabilities, roles and responsibilities of the players involved in the IP management including the Review Board, decision makers, the IPO, IP interests embedded in the Branches, Legal Services and other Environment Canada employees.

Recommendation 3

Agree. Several key deliverables have been identified and will be investigated as priority components of the IP Management Framework once the Review Board and strategic direction has been established:

- At least two formal documents providing strategic direction will be developed and released as a result of consultation, direction and approval of the ADM Steering

Committee. These documents are: guiding principles for the management of Environment Canada's Intellectual Property (available in fall/winter 2006); and a revised EC Intellectual Property policy (available in winter/spring 2006/07).

Subsequent deliverables to be addressed and scheduled as per direction from the Review Board include:

- Decision Making Guidelines for the Review Board and Delegated Authorities for IP;
- Definition of Roles and Responsibilities - the Review Board, IPO, embedded IP experts, Legal Services, Delegated Authorities for IP and EC employees;
- Development of performance measurement criteria and reporting mechanisms;
- Development and application of specialized training packages for Delegated Authorities and IP decision-makers, as well as other EC employees implicated in various aspects of IP management;
- Updating of Best Practices on IP management.

1 INTRODUCTION

Intellectual Property (IP) consists of the rights to information, ideas and inventions which have strategic and economic value, and can be protected through patents, trademarks, copyright, etc, and/or careful management of the external disclosure process. The decision of what, how, when or if IP rights should be transferred to others needs to be based on an understanding of expected benefits and obligations of the owner. IP generated by an organization, or created by others and used within an organization, needs to be consciously managed. Unmanaged IP constitutes a lost opportunity and can give rise to a range of risks including legal liabilities, monetary damages, and an inability to pursue organizational goals and results.

1.1 Intellectual Property Management in the Government

Treasury Board policy allows departments and agencies to manage IP to obtain revenues, achieve benefits for Canada or protect internal activities or meet Government of Canada (GoC) regulations or policy. The primary legislation dealing with IP is the Public Servant Inventions Act (PSIA). It states that ownership of inventions is vested with the Crown and mandates civil servants to disclose inventions. The responsibility for IP rests with the "appropriate minister" and the PSIA allows for inventors to receive an award that can range from 15% to 35% of license revenues to a set maximum. Managers that are delegated the responsibility can decide on the award amount within TBS guidelines. Revenues from licensing of IP are returned to the originating department.

> The Government of Canada, in 2002-2003, received $15.5M of royalties from a total of 1,400 licenses. (Source: Statistics Canada).

1.2 Intellectual Property at Environment Canada

EC's interest in IP stems from its S&T activities and by defined needs or desired results. In some cases the drivers are internal requirements, for example resulting from activities related to weather monitoring and forecasting; in other cases, S&T activities aim at improving the environmental or monitoring performance of external organizations, such as Canadian non-governmental organizations or companies. In either scenario, EC has a strong interest in securing the rights required to use the arising results for the intended purposes, and leveraging them toward maximized benefits for Canadians wherever possible.

EC has developed policies, processes and institutional arrangements in response to the federal IP management regime. Policies include: the Intellectual Property Policy (1996, updated in 1999 but never formally approved); the Awards Policy for Inventors and Innovators (undated), and the Policy on Revenue and Collaborative Arrangements (2000).

An Intellectual Property Office (IPO) was created in 1992 within the former Environmental Protection Service (now Environmental Stewardship Branch). In 2005 following a restructuring of EC, IPO was moved to the Finance and Corporate Branch. The IPO is responsible for a) providing expertise to departmental managers on the protection and commercialization of technological IP, b) maintaining a departmental database on IP, c) providing training, and d) representing EC on the interdepartmental Federal Partners in Technology Transfer (FPTT) committee. The IPO was also tasked with a role in marketing

according to the EC's IP policy. Such a role has been taken on in some of EC's units by IP management / technology transfer specialists embedded in the science operations. Currently, such a position only exists within the Business Policy group of the Meteorological Service of Canada.

EC focuses its official IP management efforts on patent protection and licensing, and therefore performance information is primarily available for these areas (see the text box 'Licensing').

Licensing

Environment Canada (EC) has 21 active licences with annual licensing revenues of $565K to $1.3M modest level. In FY 2004 / 2005, almost 80% of licensing revenue was derived from two technologies: Forecast Production Assistant (FPA) and Microwave Assisted Processes (MAP™).

While the effects of IP management are primarily noticed at the stage where results have been obtained from S&T activities, the foundation for the use of those results is frequently laid in the very early stages of a project. Most notably, in planning S&T activities, steps are often taken that may compromise later use of IP or conversely open opportunities for greater impacts. The map presented in Figure 1 outlines a simplified model of the range of IP management activities. Adequate IP management is a key enabler in supporting Environment Canada in the fulfilment of its mandate and priorities.

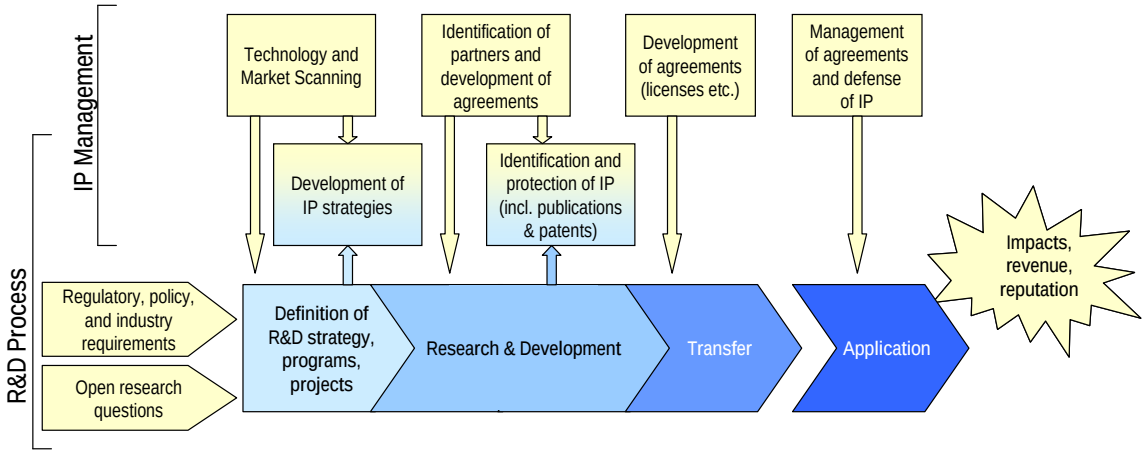


Figure 1 Range of IP Management Activities

1.3 Purpose

An assessment of Intellectual Property (IP) management at EC was approved by the Departmental Audit and Evaluation Committee as part of the 2004/05 to 2006/07 plan. Originally, the assessment was conceived of as an audit of management practice issues related to the commercialization of Intellectual Property. Subsequent consultations with senior managers revealed the need to broaden the analysis to non-licensed as well as licensed IP and the policy regime governing IP management practices. Thus the nature of the assessment was changed from an audit to an evaluation.

The purpose of the evaluation, therefore, was to assess EC's Intellectual Property policies and practices. The objectives of the evaluation are to:

1) Document EC's policies, methodologies, decision-making processes, institutional arrangements, activities and products used by EC to identify, protect, and commercialize Intellectual Property;
2) Map EC's protection and commercialization of IP within the broader research and development process;
3) Assess EC's practices against its stated policies, methodologies, decision-making processes, practices, institutional arrangements such as the IPO, activities and products, and against policy and regulatory requirements of the Treasury Board Secretariat;
4) Assess EC's experience against experiences of other science based government departments and organizations, focussing on critical areas of similarity and differences of approach and practice; and
5) Identify gaps, best practices and success factors to improve EC's protection and commercialization management of IP.

1.4 Scope

The evaluation addresses:

- IP arising out of research, science and operational activities, including software and data;
- A sample of IP partners and beneficiaries from both domestic and international levels; and
- Comparative experiences of other science based and research departments.

The evaluation scope specifically excludes:

- Tacit knowledge of staff;
- Trade secrets, copyrightable material in procurement contracts and publications; and
- IP issues related to the procurement of services.

The time frame for the evaluation is from 1992 (the year that federal departments became responsible for managing their own intellectual property) to March 2006.

1.5 Key Evaluation Issues

The evaluation examines three issues.

1) Relevance: extent to which EC's IP policies processes and institutional arrangements support the role and responsibilities and priorities of EC as well as federal government policies acts and strategies related to IP.
2) Effectiveness: extent to which intellectual property is protected, transferred and commercialized by EC, including consideration of secondary and unintended results.

3) Efficiency: the adequacy and appropriateness of the use of resources and institutional arrangements behind IP management (e.g. is the Department is getting value for money in its IP management activities).

1.6 Methodology

A series of evaluation questions were developed to address the issues presented in the purpose section. The evaluation questions were then developed into an Evaluation Framework that is included as Annex A. The program evaluation methodology used multiple lines of inquiry to address the evaluation issues.

Documentation Review

Eventual documents that were reviewed are outlined in Annex B. Each document was reviewed using a standard document review template included in the Technical Papers under separate cover. The template identifies the elements sought based on the Evaluation Framework. Documents included acts and regulations, policies, position papers from EC and other Science Based Departments and Agencies (SBDA), active license files that include agreements, correspondence and patent filings. Twenty-five documents were reviewed along with approximately twenty active files.

Interviews

Interviews were used to build on or provide further detail on information obtained from electronic systems, paper files and other available information sources. Interviews utilized an Interview Guide. Interviewees were assured that their results would be aggregated and not identified to EC staff.

Stakeholders were identified from the stakeholder map developed by the evaluation team. This map was used to ensure that interviews covered the full range of stakeholders. Annex C includes a list of interviewees. In all, thirty-one interviews were conducted consisting of fourteen senior managers (Director Generals and above), seven past and present members of the IPO, five science staff and five representatives from OGDs.

Case Studies

Three specific projects were selected and used as case studies. The Evaluation Framework was used to identify specific evidence that the case studies were seeking. Case Studies are enclosed in the Technical Papers under separate cover. The case studies were used to provide concrete examples of indications received in the interviews. In general, the case studies were done after the preliminary set of interviews to identify potential issues for further examination. Case studies involved detailed file and document review, site visits and detailed interviews with principle players in the project. The three cases were:

- Microwave Assisted Processes (MAP™);
- Dehaloginization of Soil (B12); and
- Precipitation Occurrence Sensor System (POSS).

The first two cases were protected and commercialized and the last case represents a technology that was not protected. The case studies were selected to reflect a broad cross section of the Department and to reveal a variety of potential issues.

Survey

An electronic survey was developed and sent to science-based branches within the Department. The survey had over forty questions and was available in both official languages. The survey used branching logic so that if a respondent were unable to answer a set of questions (e.g. they were not involved in the activity being surveyed) they could skip that set of questions or exit the survey early. Over 350 respondents filled in the electronic survey. Survey results are summarized the Technical Papers under separate cover.

Limitations

There are two limitations to the methodological approach taken in the evaluation.

1) The impacts of IP decisions often occur several years after the decision is taken. For this and other reasons, it was understandably difficult to attribute outcomes and impacts from the decisions arising from IP management. This significantly impacts the evaluation by forcing the team to rely on anecdotal evidence for impacts of decisions.
2) By necessity of time, budget and available information, the study focused on licensed technologies and large parts of the IP field were removed from the scope. This impacts the evaluation study because it cannot draw conclusions on aspects not studied. An example of this is published scientific papers, which do not normally come to the attention of the IPO or pass through a formal review process.

To address these limitations, the Evaluation Team: took lapse times into consideration in developing interview questions, looked at as broad a range of IP licenses as practical and designed the survey to address fact-based questions as much as possible.

2 FINDINGS

This section presents the findings of the evaluation, which are reported against each evaluation issue. The overall finding of each evaluation issue is presented before the more detailed findings.

2.1 Relevance

EC's IP policies, processes and institutional arrangements support broad Government of Canada policies and requirements. They do not, however, provide strategic corporate direction to ensure that a) EC's IP relates to the department's mandate, goals and priorities, and b) IP rights are considered early in the science management, regulatory and policy processes.

1. While EC's policies are consistent with broad GoC direction, EC's policies lack specific guidance.

Department legislation (e.g. the Department of the Environment Act and Canadian Environmental Protection Act) does not direct the Minister to promote technology transfer or to conduct research leading the formation of significant intellectual capital. This does not negate the reality that Environment Canada is a science-based regulatory department that generates IP. IP within EC arises from a range of mandated activities, including research, development, and operations. As evidenced in the case studies and mentioned by interviewees, mandated activities require the protection or licensing of certain IP, often developed in-house, in order to ensure EC's continued rights to use its data and technologies, or to obtain instruments for internal use. EC's mandate to properly manage IP arises from responsibilities incumbent on all federal departments.

Government policies and strategies relating to IP are general, providing departments the flexibility to determine the use of IP according to their mandate and priorities. The Public Servants Inventions Act (PSIA) provides the basis for IP management This Act stipulates that IP arising from a department's employees' work is vested in the Crown. It also requires public servants to disclose inventions developed within the course of their work.

"Every public servant who makes an invention (a) shall inform the appropriate minister of the invention and shall provide the minister with information and documentation with respect thereto as the minister requires" and "every person who contravenes subsection 4(1) is guilty of an offence ..." **PSIA - Section 11**

Based on the extremely low number of invention disclosures, and given the large S&T budget and personnel pool and the innovative nature of work conducted in many program areas of the Department, it is plausible that all inventions are not reported. In addition to the PSIA, there is a Treasury Board Secretariat (TBS) guideline that outlines the reassignment of revenues from licensing to individual department and allows for the payment of awards to individual innovators and inventors. EC's awards program,

"licence revenues… are intended to be used toward the costs associated with incentive awards for technology transfer and other technology transfer activities undertaken by the department of agency. - **Retention of Royalties and Fees from the Licensing of Crown-Owned IP, Sid Gersberg, Assistant Secretary, Programs Branch, TBS, June 19. 1993**

while not providing consistent payments across different internal groups, does follow the TBS guideline. EC does not, however, follow the directive in the use of revenues within the department toward further business development activities. EC generally assigns revenues to the group from which the invention originated, a practice that is standard among SBDAs.

2. Lack of strategic direction yields conflicting senior management views and impacts staff at all levels.

Overall, EC's staff and managers are not aware how IP management contributes to the achievement of the Department's mandate. The TBS IP Policy supports general government direction towards improving economic and environmental sustainability through collaboration between private and public sectors. The Department's IP Policy (1996, 1999 draft) has two objectives for IP management:

1. *To transfer suitable technologies which result from ongoing DOE R&D and program activities and thereby,*
    - *encourage beneficial application of environmental technologies to improve the quality of life for Canadians;*
    - *support the sustainable development of Canadian economic activity for increased international competitiveness and job creation;*
    - *help support further R&D activity from royalty revenues returned to the originators of intellectual property, and*
2. *To promote collaborative arrangements between the Department and Canadian industry and universities and other government organizations, domestically and internationally, for the development and application of environmental technologies.*

Despite the existence of EC's IP Policy and a Policy on Revenue and Collaborative Arrangements, there is no agreement among EC staff, and particularly among senior managers, regarding the intent and objectives of IP management within the Department. In particular, the emphasis on "commercialization" and licensing of technologies has shifted over the years, and current senior managers are questioning the relevance of licensing activities within the current policy context.

> "Does EC know when to let a technology go; is there a moral hazard from decisions makers potentially profiting from rewards and focusing on revenue generation as a result?" - **Senior Manager**

A specific IP strategy is not evident to address specific IP issues, such as:

- whether and when to transfer technology;
- whether or not to charge for IP;
- how and when EC can reduce its internal investments into licensed IP rights; and
- What the equivalent of an exit strategy can look like for a federal department, i.e. in a situation where EC cannot (easily) divest its IP rights.

The evaluation found that much of EC's past IP management activities consisted of attempts to protect and license IP that was identified as potentially valuable in a rather happenstance manner, based on the experience of individual scientists and their ability to

recognize and exploit opportunities once a technology or software was developed. This was seen in each of the three case studies.

3. EC's IP policies, processes and institutional arrangements may require further adjustments to align with the recent organization changes and departmental direction.

Environment Canada is in the midst of a transition period following an organizational restructuring during the period of this evaluation. This reorganization changed the functional and line reporting arrangements of the Intellectual Property Office (IPO) to a line reporting relationship with Assets, Contracting and Material Management.

There are two lines of argument relating to the location of the IPO within EC. On the one hand, IP is considered an asset as are facilities, human resources and capital. As such, it could be managed corporately. On the other hand, IP management is an integral part of science management. In essence, planning for science and technology outcomes is planning the development of IP, and IP decision-points arise at many stages within science and operating activities. In addition, managing IP requires intimate familiarity with the respective technologies fields and requires good working relationships with S&T staff. Therefore a strong argument can be made to embed the IP function within S&T and operational units.

2.2 Effectiveness

The Department does not have a complete corporate picture of its IP. As the Intellectual Property Office has focused its efforts on monitoring and cataloguing EC's licensing agreements (e.g. royalties generated), EC does not have a corporate record showing IP which has been identified and disclosed, or transferred to users at no cost. Further, the Department does not formally track the environmental, social, economic and other benefits of its licensed and non-licensed IP. EC's IP that is identified and related to licenses and patents is protected to a degree commensurate with the risk but when IP rights are not identified, EC is exposed to a range of risks.

1. IP Management effectiveness is hampered by lack of strategy and performance monitoring.

Evidence from all lines of enquiry indicates that IP management activities are generally not planned for at the onset of S&T activities. Based on evidence from interviews with scientists and from the three case studies, IP management activities are typically triggered when a scientist recognizes that there might be value in protecting a certain technology. There are no defined processes for the identification of IP.

The IPO does not address the full spectrum of IP activities required throughout Environment Canada. A simplified map depicting Environment Canada's IP management activities is presented on the next page as Figure 2. The function at the far right (*Management of agreements and defence of IP*) are fully utilized, those where there is some activity but not fully implemented are in the middle (*Development of agreements, Identification and protection of IP,* and *Identification of partners and development of agreements*) and the functions on the left (*Technology and Market Scanning*, and *Development of IP strategies)* are generally not carried out in the Department.

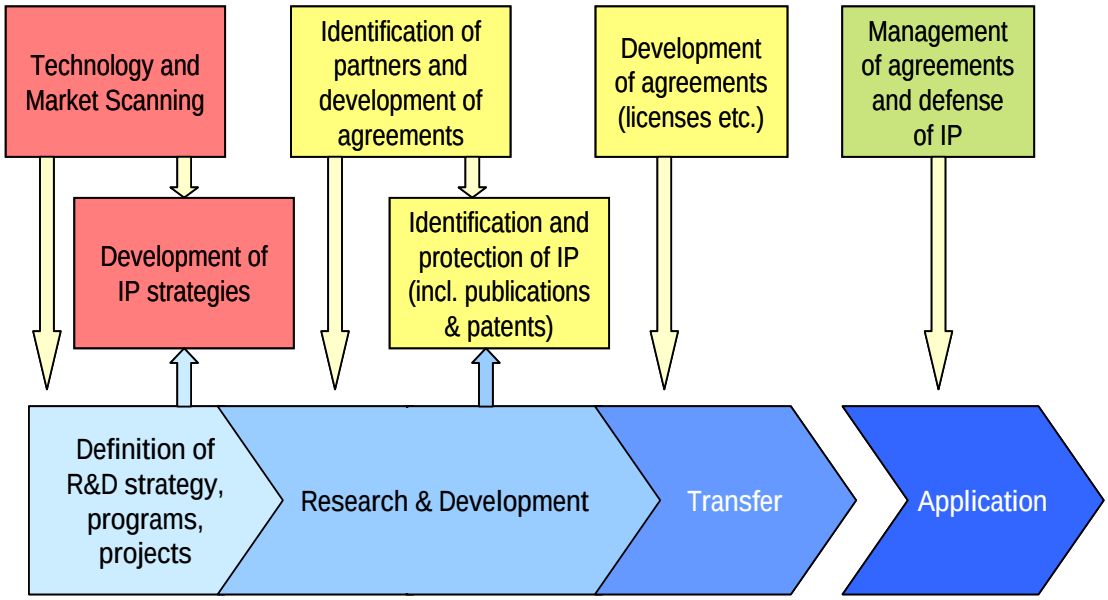
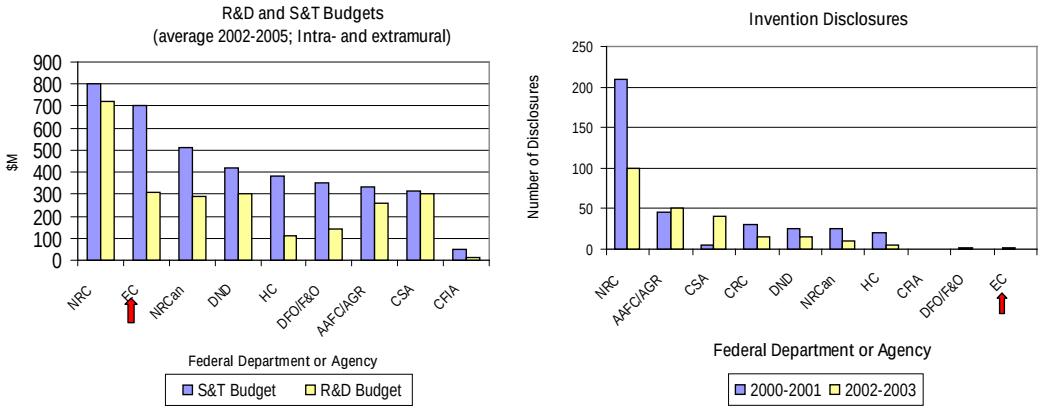


Figure 2: IP Process Map

Training that would allow scientists and managers to expertly identify IP is lacking. Interviewees and survey respondents generally reported a lack of training. In the case studies, the research managers reported that they felt under informed to make the decisions they had to make.

The lack of systematic processes and expert support in the planning for and the identification and evaluation of Intellectual Property has led to a situation where it is likely that opportunities for EC to achieve benefits are lost. For example, in one case study publication occurred early and the program was unable to patent the technology.

Although EC has one of the largest S&T staff and budgets within the federal government, it generates only one or two official invention disclosures per year – about the lowest of all SBDAs (see graphs below). This may be due to inventions not being identified as such, which suggests that many of the undisclosed inventions will not benefit from IP management consideration. It also poses risks that EC may be unable to benefit from research findings and data as planned and senior managers may find staff in violation of PSIA requirements.

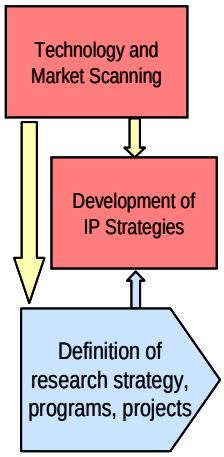


During interviews an attitude that "technology transfer is secondary to science" was identified. This attitude could prevent managers and scientists from recognizing and planning towards potential benefits. In the current operating environment, technology transfer and commercialization of products and services through partners could be better positioned as means to achieve EC's goals and objectives. Such positioning would facilitate the development of clear objectives for IP management that are aligned with EC's interests.

> "… it takes a lot of effort to go through the patenting process … If the department is not going to support the whole process, it maybe should not be done because it is a lot of work" - **Researcher**

2. EC's IPO provides effective IP management support in specific areas.

Where the IPO does provide services, interviewees (all levels) have generally expressed satisfaction with the advice received. The evaluation found that the processes and systems used within the Intellectual Property Office are appropriate and effective. Deadlines generally are met, patents and license agreements are enacted and tracked and advice is delivered upon request. While the case studies uncovered an instance where a Canadian patent filing deadline for the Precipitation Occurrence Sensor System (POSS) technology was missed a number of years ago, it seems that such an incidence is less likely to happen with the current technology system in place and an agreement struck with an external patent agent to monitor patents renewals.



It is worth noting, however, that the lapsed patent deadline seemed related to the high turnover of staff within the IPO at the time, and the transitions may not have been handled appropriately. Staff turnover continues to be an issue for the IPO as key personnel, particularly the manager's position have seen a large number of incumbents in the recent past.

EC's IP activities only partially address IP arising from R&D activities. The IPO currently focuses on providing IP advice and managing IP protection activities. Important IP management functions, such as technology assessment, partner evaluation, negotiation of agreements (including collaboration agreements), marketing, surveillance of protected IP with regards to infringement, and gathering and analysis of competitive technology intelligence have become the responsibility of scientists and managers.

Most interviewees point out, some quite emphatically, that they are not well positioned, both in terms of their expertise, skills and experience, and in terms of their availability and priorities, to address the functions outlined above in an appropriate fashion. The call for additional resources, especially staff embedded in the scientific and operational environment was brought forward by a broad range of interviewees.

As a consequence of the narrow focus of IP management activities to date, a framework for monitoring and tracking performance information relating to the broader IP management activities and results does not exist.

3. IP has brought a broad range of benefits to the Department.

While there is currently no systematic framework for capturing the overall benefits of EC's IP management, the evaluation has identified that effective IP management has contributed to longer-term EC benefits in a variety of areas. These include:

- environmental benefits (e.g. reduction in greenhouse gas emissions);
- health benefits (e.g. improved air quality);
- economic benefits (e.g. jobs created, revenues to the Department); and
- Social benefits (e.g. public making better informed decisions).

There are also intangible benefits such as the prestige and public awareness that has been gained by the Department's effective promotion of weather data, statistics and even trivia.

Some of these benefits are not derived until ten or more years after the initial invention and depend on contributions from a range of organizations and individuals. More immediate benefits consist of EC's ability to control the use or dissemination of results and data, the ability to find manufacturers for instruments developed internally, the protection of research and operational areas, in particular in the context of collaborations. The case studies demonstrate clearly the benefits of effective IP management combined with the ability to respond to changing partner needs. The environmental benefits resulting from the licensing of MAP™ technologies and the departmental profile gained from the recognition of the innovation behind those technologies have benefited the Department in more ways than just fiscal revenues.

EC continues to be recognized by others for excellence in S&T. The NWRI was presented the prestigious Cannes International Prize for Water and Sciences in June 2003, for its work in applied aquatic research. – **Innovation in Canada website**

For a department with strong regulatory and policy functions, such as EC, many mission-critical benefits are derived from knowledge- and technology-based collaborations and transfers to external stakeholders. These benefits may not be derived from patented IP and may not involve the receipt of fees and other payments from partners (see the text box 'Survey Results'), and as such are have not been identified or documented systematically.

Survey Results:
62% of survey respondents report that they provided IP at no cost
Only 14% of survey respondents report that they provided IP for a fee over the past few years

4. The lack of attention to certain IP management areas has exposed the Department to risks.

Potential scenarios of risks include:

- Without due attention to the wording of agreements, EC could a) restrict the future use of IP arising from collaborations or from IP that has been provided to a licensee or b) obligate itself to ongoing support of transferred technologies (e.g., updates, continued research).

- EC may use IP owned by others in its research efforts without the license to do so and thus expose itself to litigation. Particularly damaging would be a scenario where EC used IP in the development of a piece of software or a technology that it then licenses to external parties without first obtaining the rights to do so. Such scenarios could easily happen in the context of open source software.
- Partners may not fulfill their obligations within the context of agreements.
- EC may inadvertently (e.g. through lack of communication or knowledge) not fulfill its contractual obligations to partners.
- Without coordination of agreements relating to licensing, collaborations and services, EC may inadvertently contractually bind itself to transferring the same rights (exclusively) to two different parties.
- Without systematic and regular review of patent databases and publications, EC exposes itself to the risk that it would invest into research only to find upon its completion that such results have already been obtained and patented.

It is important to understand that these and similar risks are inherent in interactions with external parties. They can be managed and minimized, yet due to the nature of business relationships, and due to changes in the operating environment it is impossible to foresee and develop provisions for all risks. Like risk management in other context, the preferred approach is to identify the most likely and the most damaging risk scenarios and provide mechanisms to address them.

These risks can lead to a range of damages: litigation costs often outweigh any potential licensing or collaboration revenues, limitations on the use of IP can severely affect the department's ability to deliver on certain program objectives, and poor management.

2.3 Efficiency

In the absence of strategic corporate direction, EC's IP decisions are taken at the individual managerial level resulting in inconsistent practices across the department. Often individual managers are not trained in IP management and make decisions based on their own experience, with limited awareness or involvement of the Intellectual Property Office. Resource requirements for IP management can be expected to rise in the future, if IP is to be managed early rather than at the end of the scientific process, and if the Department decides to widen the scope and activities for IP management.

1. Many IP management processes are unmanaged at the corporate level.

The current activities of the IPO focus on providing advice on patents, licensing, copyright, and trademarks, and on managing the patent and license portfolio and innovators' awards. These services are most frequently provided, in response to a client request, to science and technology based units within EC. Interviewees close to EC's IPO, as well as those from other government departments highlighted the importance of early involvement of IPO staff (and Legal Services) in the management of IP, and the benefits derived from close organizational proximity within S&T-based operations.

While the current corporate IP processes do meet EC's basic IP management needs in certain respects, they are not ensuring consistency across EC and excellence across the

range of required IP management functions. The following are key areas of concern in this context:

Consistency: Decision-making is delegated to the Delegated Authorities, who, until recently, could be at the manager level. No consistency is applied across Delegated Authorities for their decision-making, as they do not work from a consistent knowledge base or established guidelines and are advised but not required to involve the IPO in their decision-making. Delegated Authorities and scientists do not require any mandatory training as is required for other signing authorities.

> *…. The individuals exercising this authority should note that the Deputy Minister has assigned specific functions and responsibilities to the Intellectual Property Office (IPO) in matters of management of intellectual property**. Individuals should consult the IPO prior to exercising their authority** – **Environment Canada Delegation of Authority, Section 7.4***

Decision Making: IP decisions are made by individuals who are not IP experts, without sufficient training. Likewise, scientists are not adequately trained, supported, or mandated to conduct the bulk of business development activities in which they are currently engaged. Scientists and managers make corporate decisions based on their own experience and that of colleagues, rather than based on expert advice and support. Notwithstanding the above, most scientists feel that proper decisions are being taken. However, on a number of occasions, groups have published without realizing that that action prevented them from future patent action. In some cases, the decision ended up not seriously impacting the department; while in at least one other it did affect the department's ability leverage its research and operational investment. (POSS Case Study)

IP Processes: There are no consistent corporate criteria or approaches on appropriate mechanisms to select. Decisions to publish are not subject to IP reviews and are done by local managers (publishing can result in loss of IP protection). Invention Disclosure policies are either not in place or not known in program areas (survey findings).

'Value for Money' considerations: Performance data beyond the basic patenting and licensing information is unavailable. Therefore, assessments of the range of benefits are not possible.

2. Delegated Authorities are not adequately trained and supported.

During the period under review, the Delegated Authority tool assigned corporate decision-making down to varying managerial levels. The delegation of authority refers to "the signing of licenses; assignments and other technology transfer arrangements; documents pertaining to patents; trademarks; copyright and awards to inventors and innovators; and any other document relating to the development and use of Intellectual Property on behalf of the Minister".

While such an arrangement is necessary, useful and appropriate, there are concerns with regards to the expertise and support of Delegated Authorities to make such decisions. Delegated Authorities do not receive any form of specialized, mandatory training, and do not have

> ***Question:** Do you get sufficient information to manage the IP component of your job?*
> ***Answer:** No (from most respondents) -* ***Delegated Authority***

access to tools and guidelines to support their decision-making. Given that consultations with the IPO are ad hoc in nature, concerns exist in terms of quality control and departmental consistency.

Many individuals with Delegated Authorities have expressed concerned about their lack of expertise, and often defer to the inventors for key decisions.

3. Many direct and hidden costs are borne by research groups.

IPO costs are only a subset of IP management costs. Additional costs arise from the broad range of activities conducted by scientists and managers, and their consultations with external patent agents and Department of Justice lawyers.

In many cases, the costs consist primarily of scientists' and managers' time commitments. This is especially true for activities relating to technology assessment, partner evaluation, and negotiation of agreements. In the shorter term and for smaller projects, these costs are absorbed within existing time planning and local budgets. In the longer term, these commitments can place a drain on the resources of the scientific or operational group. Expenses for patent or similar protection are also generally incurred by the science and operational groups. Many of these groups work within tight budgets, and these additional potential costs may be a deterrent to effective and appropriate IP management

4. The current level of funding for its IP function does not allow EC to systematically manage IP towards anticipated benefits.

Corporate critical activities, such as asset management (IP is a departmental asset), require secure and sufficient funding. IPO operating costs have been fairly level and A-base funded, and hence fairly secure (as opposed to project or cost-recovery funded). The IPO has had a salary budget for 4 - 6 persons and sufficient O&M resources to invest in staff training to a suitable level. IPO funding is sufficient to conduct IP maintenance activities and essential services related to administration of agreements already in force.

Funding levels do not allow for support in business development activities such as marketing, negotiation, and technology assessment; or for patent analysis for management and policy purposes. They do not provide resources to proactively identify emerging opportunities, develop comprehensive strategies and market EC technologies.

The current IP funding model fails to use central funds to encourage corporate behaviour (e.g. patent evaluations). This lack of corporate funding has occasionally caused some Delegated Authority to not pursue patent activities based not on an understanding of the benefits but rather on an unwillingness to invest research funds to protect the corporate asset of IP.

5. There are no corporate criteria or processes to guide decisions – management is inconsistent.

Revenues from licenses are tracked along with counts of IP files (e.g. trademarks) within the systems at the IPO. According to interviewees and survey respondents, this management information is not broadly shared. Patent management costs are tracked and are available to Delegated Authorities on a case-by-case basis upon request but this is not promoted and is rarely requested. License and patent due dates are tracked by the IPO and

patent agent. There was no evidence of performance reports to executive committees or senior management to support corporate decision-making.

The performance data tracked to date does not capture benefits and impacts realized through the transfer of knowledge, data, and technologies. It also does not include the entire range of IP management activities and outputs, notably data relating to collaborations and publications is not available to the IPO.

2.4 Lessons Learned from Comparative Experiences of other Science-based Departments

EC is addressing issues common to most science-based departments. More and more other Science-based Departments and Agencies are looking to collaborative models to leverage their IP.

1. EC's challenges in its IP management are similar to those of Other Government Departments.

Based on interviews with experts from other government departments, it is clear that the lack of clarity in government directions and the inconsistencies in the existing directions over time has led to challenges among most SBDAs. In particular, the alignment of technology and knowledge transfer activities with mandates other that those related to activities in support of the Canadian private sector is an issue that has generally not been resolved.

Indeed, regulatory organizations such as the Canadian Food Inspection Agency along with Agriculture and Agri-Food Canada, have implemented a program that highlights the policy and regulatory alignment and benefits of systematic IP management. The program provides matching funds for collaborative projects that address policy and regulatory priorities. In essence, industrial partners generally contribute to the program in order to develop and gain access to IP of relevance to the department / agency. The relevance of those collaborations to the policy and regulatory priorities is established in advance, and thus IP arrangements are clearly aligned with such priorities.

Similar concepts could be applied to management processes in departments in general, where the investment in IP protection and dissemination would be subject to their alignment with existing priorities.

2. Other SBDAs benefit from a combination of central and decentralized IP staff.

It is interesting to note that many SBDAs, and especially the larger ones in terms of S&T staff and budgets, have used different organizational arrangements for their IP function over time. A key element in these arrangements is the extent to which the IP function is centralized versus embedded in S&T activities. The arrangements vary depending on the perceived importance of central control and consistency versus that of familiarity with the S&T area and responsiveness to the demands of internal and external stakeholders.

NRC, AAFC, and NRCan, for example, have a corporate IP function, the role of which ranges from the provision of support and specialized services on an as needed basis to a required review of IP provisions in most agreements. In some case, these offices are also

responsible for the tracking of IP information and/or the development of IP management frameworks. In addition to this corporate function, there are individual or groups of IP management staff within the science groups (i.e. physically co-located and/or organizationally integrated into science operations (e.g. NRC institutes)).

IP experts from other SBDAs have reported that although corporate direction and guidance is essential, they find that embedded IP staff can effectively contribute to the organization's science programs by having sufficient contact with the technologies or IP in question to provide meaningful advice contributing to strategic direction or research planning.

The most beneficial solution for EC will depend to a large extent on how EC will position its IP management function in relation to other activities.

3 CONCLUSIONS

While EC's IP management is consistent with Government of Canada requirements, the lack of a corporate strategy and gaps in EC's IP management functions creates vulnerabilities

The Department policies, processes and institutional arrangements are consistent with broad Government of Canada requirements. To date, EC's Intellectual Property management (IPM) policies and practices focus on assisting the science, technology and operational managers and staff to address specific issues related to patenting, licensing and the negotiation of collaborations. The absence of a corporate strategy, supporting governance structures and tools, however, means that decisions are being made based on individual manager's experience and views as to what is in the best interests of the department and the public. The contributions of IP management towards regulatory and policy outcomes are not identified in advance, nor leveraged. A lack of a uniform approach to IP management is a key barrier to the implementation of an effective IP management system. Further, there are currently gaps in EC's IP functions; technology market scanning activities and the development of IP strategies (both licensed and non-licensed) are not generally carried out in the Department. EC's increased practice of working in collaborative arrangements brings opportunities and increased risks.

Current operating environment requires changes to the way EC manages IP

The current operating environment for EC and other S&T organizations is vastly different from that of the past. Funding constraints and expectations of increased accountability within the federal government, and trends towards collaborative S&T efforts, increased IP litigation, easier access to information on technologies and data sources through the internet, and heightened awareness of and expertise in IP management in the broader S&T community require organizations such as EC to adopt a more proactive approach towards IP management. These trends are felt at EC as well: survey respondents indicate their requirements for IP-related advice and services will increase substantially.

EC currently lacks a coherent, comprehensive and well-communicated strategy for IP management that allows for the management of risks and opportunities from the inception stages of an S&T based program / operations through to the tracking and monitoring of ultimate impacts. Without due consideration of the use of IP, the actions to protect and/or disseminate IP may not be taken. Without the identification of all IP, risks that are related to the ownership, dissemination and use of such IP may not be recognized and therefore cannot be managed effectively. Such a framework will be required for EC to effectively manage its S&T investment in the future, and to remain accountable for results and impacts. Currently, the cornerstone of a strategy – a clear articulation of EC's IP objectives and expected results – is not well defined. Senior managers have differing views, which translate into a lack of direction at working levels, and an inability for staff to make IP management decisions that are aligned with EC's interests.

Opportunities for improvement

The current situation represents an opportunity for improvement. Scientists and managers agree that the Department needs to articulate a corporate strategy to manage its IP. EC

senior managers are willing to engage in discussions on elements of a corporate approach and supporting governance structures. Interviewees agree that clearer guidelines related to IP management are required. The IPO enjoys a relatively high level of credibility among their client base. Many interviewees at all levels show a strong interest in increased involvement of IP experts within S&T based operations. These factors, many of which do not seem to exist to the same extent among other government departments, could allow EC to reposition its IP management activities and implement a system that would allow for greater impact and accountability.

4 RECOMMENDATIONS

The following recommendations are offered to assist EC in managing risks and leveraging opportunities related to Intellectual Property. Since IP management is a cross cutting issue which affects the whole department, the recommendations are addressed to the Departmental Management Services (DMS) Board for management response. Each recommendation is accompanied by a set of considerations. These considerations bring together key findings and lessons learned from the evaluation and are offered to assist DMS Board in thinking about and structuring the management response.

1. **Departmental Management Services Board, in collaboration with the Assistant Deputy Minister of Science and Technology Branch, should establish a corporate Intellectual Property management strategy**.

   Given that the Finance and Corporate Branch Assistant Deputy Minister (ADM) is responsible for the stewardship of EC's IP, and all science-based ADMs except the ADM of Science and Technology Branch are members of the DMS Board, Audit and Evaluation Branch recommends that DMS Board in collaboration with the ADM, Science and Technology Branch, articulate a strategy to guide decision-making and the management of IP. Once established, the corporate strategy will provide the direction for changes in governance structures, mechanisms, processes and operational practices.

   Considerations

   A sub-group of DMS Board consisting of ADMs of Finance and Corporate Services Branch and the Meteorological Services of Canada, and the ADM of Science and Technology Branch could be established for a short-term period to lead the development of the corporate IP management strategy. The sub-group could submit the corporate strategy to the DMS Board for approval.

   The corporate strategy could address all types of IP (e.g., copyright, patents, trademarks and processes) and could articulate:

   a) How IP management relates to the department's primary obligation to identify and manage IP ownership, protection, transfer and disposal in a diligent manner;
   b) How IP relates to the department's mandate, mission and priorities;
   c) How IP is to be viewed (e.g., as a means to achieve benefits for Canadians and as an asset to be managed with due diligence;
   d) How IP considerations relate to EC's science management and regulatory and policy processes and current initiatives such as Science Plan, Strategic Technology R&D and Demonstration Plan, and the Information Management Strategy; and
   e) How EC's IP is expected to contribute to government wide initiatives (e.g., sustainability frameworks).

2. **DMS Board should a) develop governance structures, mechanisms and processes to guide the implementation of the corporate IP management strategy, b) clarify IP management roles and responsibilities of the Intellectual Property Office, Legal Services, embedded IP specialists, Delegated Authorities and EC employees,**

particularly scientists and researchers, and c) identify funding support to be provided to IPO, embedded IP specialists and EC employees to manage EC's IP.

Considerations

- Governance structures could include the creation of an executive committee that could be mandated to recommend key decisions on IP management for approval by DMS Board. Members of the committee could consist of members of the sub-group identified in recommendation #1 plus the Chief Information Officer, and a representative from Legal Services.

- A committee needs to align the interests of science-based programs with the interests of those concerned with the protection of corporate assets.

- Key decisions could include: a) the kind of arrangements to be developed and commitments to be made with external partners, b) actions to be taken to address infringement of patents and the breach of contracts, and c) the amount to be awarded to inventors and innovators.

- The committee could lead the development of an Intellectual Property management framework and a revised IP policy. This framework could include:

    - Decision-making criteria for IP management and technology transfer that addresses key stages of IP management. Key stages include the i) planning, development and implementation of research or operational strategies, ii) identification and review of technologies for formal invention disclosure, iii) evaluation and determination of the best use of potential proprietary technologies, iv) development and implementation of IP protection and technology transfer strategies, and v) entry into appropriate agreements and arrangements to facilitate strategy implementation.

    - Performance indicators developed at the strategic level could be implemented at the level of each program area. Performance indicators could address planned and actual performance from IP activities such as licensing, publication and patenting. To be meaningful, the performance indicators could be broken down into the science-based program areas.

    - Reporting mechanisms to link strategic planning, reporting and decision-making at the corporate level.

    - DMS Board could explore means and mechanisms to ensure that IP is identified and managed appropriately. EC could consider the IP management framework developed recently at NRC (corporate), the process for identifying and assessing inventions implemented at NRC's Biological Research Institute, and a range of initiatives at AAFC, including a risk assessment tool, the Research Partnership Strategy at the Canadian Food Inspection Agency; and the recently implemented Justice Department IP related web portal.

3. The Intellectual Property Office should a) develop supporting materials for Delegated Authorities, b) deliver a mandatory training program for all Delegated Authorities, and c) inform EC employees of the responsibilities of public servants to manage Intellectual Property and services of the IPO.

The final recommendation relates to how the Department operationalizes the strategic direction, governance structures, mechanisms, processes and roles and responsibilities of EC employees to manage IP.

Considerations

Delegated Authorities require more guidance and consistency as to how to discharge their responsibilities.

Supporting Materials could include:

- Introduction to IP Management at EC;
- Roles and responsibilities for IP management;
- Specific thresholds where a sign-off from the senior managers, IPO and/or Legal Services would be required;
- Services provided by the Legal Services Unit, the IPO and embedded IP specialists in support of IP management;
- Guidelines and criteria regarding disclosure of inventions and innovator's awards and the range of other activities in the IP process; and
- Checklists for common tasks.

Delegated Authorities could be consulted to refine areas where they feel further guidance is required.

The IPO could launch an awareness campaign to inform EC employees of their responsibilities to manage IP and of the role and services of the IPO. The campaign could include the dissemination of information flyers and web based materials, and the delivery of awareness sessions.

5 MANAGEMENT RESPONSE

Recommendation 1

Agree. The Departmental Management Services Board, through an ADM Steering Committee comprised of the ADMs of Finance and Corporate Branch, Science and Technology Branch, Meteorological Services of Canada and the Chief Information Officer, will direct the development, approval and communication of a corporate Intellectual Property Management Strategy (beginning in summer 2006). This Strategy direction will establish a direct link between the mandatory Government of Canada's regulatory and policy obligations for diligent management of IP assets to the need for strategic management of IP with respect to the Department's mandate, mission and priorities. The IP Management Strategy will apply to all aspects of IP e.g., not just those studied under the Evaluation.

Recommendation 2

Agree. The ADM Steering Committee will establish and empower a Review Board (Fall 2006) which will oversee the development, approval and implementation of measures that will provide the Department with a strategically aligned Intellectual Property Management Framework that updates: decision making criteria and processes; organizational modeling/positioning; funding mechanisms; and accountabilities, roles and responsibilities of the players involved in the IP management including the Review Board, decision makers, the IPO, IP interests embedded in the Branches, Legal Services and other Environment Canada employees.

Recommendation 3

Agree. Several key deliverables have been identified and will be investigated as priority components of the IP Management Framework once the Review Board and strategic direction has been established:

- At least two formal documents providing strategic direction will be developed and released as a result of consultation, direction and approval of the ADM Steering Committee. These documents are: guiding principles for the management of Environment Canada's Intellectual Property (available in fall/winter 2006); and a revised EC Intellectual Property policy (available in winter/spring 2006/07).

Subsequent deliverables to be addressed and scheduled as per direction from the Review Board include:

- Decision Making Guidelines for the Review Board and Delegated Authorities for IP;
- Definition of Roles and Responsibilities - the Review Board, IPO, embedded IP experts, Legal Services, Delegated Authorities for IP and EC employees;
- Development of performance measurement criteria and reporting mechanisms;
- Development and application of specialized training packages for Delegated Authorities and IP decision-makers, as well as other EC employees implicated in various aspects of IP management;
- Updating of Best Practices on IP management.

Annex A: Evaluation Framework

Information gathering is the key to successful evaluation. The extent to which high quality information – that is information that is accurate, sufficiently precise and exhaustive, and comparable across years and across different organizations – is available, greatly influences the quality of the evaluation. Information of unknown quality or that is mistakenly judged as more reliable than it is can introduce strong biases into an evaluation, at times to the point of leading to erroneous conclusions. The approach was driven by an Evaluation Framework and supported by four information-gathering methods.

Evaluation Framework

The Evaluation Framework was developed by the evaluation team based on the evaluation issues. It consists of five components:

Issues

The evaluation issues are the four primary areas of investigation for the evaluation. Three of these are dictated by standard practice to be: relevance, effectiveness and efficiency. The fourth issue is the capture of lessons learned.

Evaluation Questions

The questions represent a fine breakdown of the evaluation issues. They are assigned to one of the four evaluation issues: Relevance, Effectiveness, Efficiencies or Lessons Learned. Each evaluation question is numbered as Issue x-y where x is the numeric representation of the evaluation issue (e.g. Relevance is Issue #1) and y is a sequential number. Evidence, findings and recommendations will emerge for each evaluation question.

Lines of Inquiry

The lines of inquiry present the approaches taken to address the evaluation question. They represent factors of the question such as impacts, costs, expectations, degrees of understanding, etc. Multiple lines of inquiry can be used for any evaluation question.

Indicators

Indicators are specific measures that will be captured, if possible, to provide evidence to support findings and recommendations.

Source

The source is the various sources that will be used to capture evidence to perform the evaluation and to support findings and recommendations.

The following pages provide the Evaluation Framework used for this evaluation.

Issue	Evaluation Question	Lines of Enquiry	Indicators	Source
1) Relevance:	1-1) Is the mandate for IP management within EC clearly and sufficiently articulated in founding legislation?	• Evidence of the importance of IP management in the Dept. of the Environment Act, CEPA, and CEAA • Evidence that IP policy reflects the founding legislation principles	• References to IP in founding legislation • References to founding legislation in IP policy	• Document review of acts • Review of IP Policy
	1-2) Do EC's IP policies, processes and institutional arrangements align with the recent organization changes and departmental direction?	• Evidence of linkages between IP policies and program activities • Linkage of IP to corporate strategies such as sustainable development, the Corporate Services Blueprint, and the new Competitiveness and Environmental Sustainability Framework. • Consideration of other internal influences on IP decision making • Indications of contribution of IP management to the various Boards	• Reference to dept. priorities in IP guidelines and procedures • EC program Managers' frequency of consideration of IP in strategic plans • Match between IP management objectives and new departmental objectives • Performance measures related to new objectives	• Document review of Main Estimates, policies and the CESF • Review of IPO procedures and policies • Interview with Manager, IPO • Interview and Survey with EC managers/executives • Document review of CESF and new organization structure
	1-3) Are EC's IP policies and objectives consistent with government-wide IP direction, acts, regulations and strategies?	• Evidence of linkage with government wide science and technology agenda, innovation agenda, policies and guidelines	• Discrepancies (or lack) with established government direction	• Document review – IP Policy, Innovation Agenda(s), Main Estimates, GoC policies, acts and regulations • Interview with Managers, Manager, IPO and OGDs

Issue	Evaluation Question	Lines of Enquiry	Indicators	Source
2) Effectiveness:	2-1) Are planned IP protection or commercialization activities actually being implemented and are they meeting, or likely to meet, articulated objectives?	• Comparison of planned versus actual IP protection activity levels • Achievements reviewed against prescribed objectives, plans and processes (actual vs. expected results) • Comparison of planned versus actual activities in the areas of business development, legal advice • Human and Financial resource allocation	• Performance targets for IP management • Count of invention disclosures, patents, patent applications, patents issued, patents in force, licenses, total license royalties, etc. by program area	• File review • Case studies • Review of RPP, budget and workplans • Interviews with managers, IP staff • Survey
	2-2) Have the expected environmental, economic, and social benefits of identification, protection, transfer, and commercialization of IP been achieved?	• Identification of economic and social benefits • Evidence of how the IP has supported the Department's mission/mandate • Comparison of planned versus actual IP outcomes	• Existence of reporting requirement, long-term objectives in agreements, post transfer evaluation. • Environmental impact indication (e.g. reduction in pollution levels, increased resource conservation - anecdotal) • Economic indicators (e.g. size of sector, partner revenues, jobs, skills development conservation - anecdotal)	• File review • Case studies • Statistics Canada data • EC published data (EC website) • Interviews with Managers • Survey
	2-3) What secondary benefits, unintended results or liabilities have arisen from EC's management of IP?	• Evidence of unexpected impacts both positive and negative	• Existence of processes to manage obligations incurred by the Crown • Evidence of damages to the Crown • Evidence of unanticipated secondary benefits (e.g. spin off technologies, new partnerships) • Emerging HR issues, changes to morale	• File review • Case studies • Survey • Interview with Managers, scientists, IPO staff, Legal Services and HR

Issue	Evaluation Question	Lines of Enquiry	Indicators	Source
	2-4) Who are the external users of IP generated by the Department?	• Evidence of the uses and application of IP at different levels (e.g. (provincial/territorial, national, international, private sector)	• List of IP users/recipients	• File review • Survey • Case studies • Interviews with IPO staff, Managers
3) Efficiency:	3-1) What are the IP related roles and mandates of scientists, senior managers, decision-making committees and the Intellectual Property Office and are they appropriate?	• Process to be followed in deciding direction and extent of protection and commercialization of IP • Roles and responsibilities identified in decision making processes • Rationale for arrangements, logic for centralization vs. decentralization of IP function	• Key decision points in the identification, protection and commercialization of IP • Documented roles and responsibilities in Terms of Reference or job descriptions • Evidence of application of governance process in IP decisions • Evidence of supporting documentation for decision model (central vs. decentralized)	• Review of IP policy • Review of IP procedures • Review of Terms of Reference of departmental decision making bodies • Interviews with executives • Interviews with IPO staff • File review • Case studies
	3-2) What activities are undertaken to inform and support managers and scientists in the identification and management of IP?	• Breadth of dissemination activity • Comparison of planned versus actual of training and awareness activities	• Counts of information activities • Number of EC staff aware of IPO and its function • Information products available to EC managers and scientists	• Document review of any guides and information packages • Interviews with managers and IPO staff
	3-3) Are EC's policy objectives, strategies, etc. to manage IP sufficiently documented and understood within the Department?	• Breadth of dissemination activity • Prescribed definition vs. the interpretations of managers and scientists	• Proper and appropriate references to IP in program business plans and institutional arrangements (e.g. IP participation of committees) • Consistency of understanding among EC staff • Consistency of IPO communications	• Document review of IP awareness activities • Interviews with EC staff and managers • Survey

Issue	Evaluation Question	Lines of Enquiry	Indicators	Source
	3-4) Are sufficient tools internally available to efficiently support the management of IP?	• Existence of guidelines, indicators, decision criteria and technology tools (e.g. databases)	• Comparison of existing versus required tools • Comparison of existing against OGDs and peer agencies • Satisfaction with tools	• Interviews with scientists and their managers • Survey • Document review of IP management tools
	3-5) Is sufficient and appropriate IP management performance information captured, monitored and reported? Is this information used?	• Performance information captured and reported • Evidence of fact based IP decision making • Actual vs. expected information and use of information in planning, decision-making processes	• Coverage of management reports across IP management activities and programs • Manager /executive awareness of and use of information	• Interviews with managers • Review of management reports • Survey
	3-6) Is sufficient IP expertise available and who is providing it?	• Confirmation that services have capacity to reach clientele, no major flaws in logic or design inhibiting achievement of results • Coverage of IP expertise skill sets as compared to other science based departments	• Mapping of skill set to needs • Comparison of skills against peers • HR expenditure per case	• Interviews with EC managers, IP staff and other research agencies • Survey • Case studies • Review of Organizational charts and job requirements • Literature review with peers
	3-7) Was an appropriate selection mechanism followed with timeliness, due diligence and fairness?	• Method of selection of partners; criteria considered • IP Solicitation and evaluation/selection methodologies. • Evidence of thorough review appropriate to financial risk and benefit	• Indicators of adherence to processes • Counts of instances of divergence from procedure (e.g. special treatments) • Number of comments/iterations during review steps • Time for process steps	• Document review • Interviews with scientists and external parties • Survey • Case studies
	3-8) Were the appropriate mechanisms (e.g. patent, publication, licensing) selected to both protect and leverage the department's IP?	• Profile of instrument selections and indications of consideration of alternative mechanisms	• Profile of mechanism use	• File review • Survey • Interview of scientists, managers and IPO staff • Case studies

Issue	Evaluation Question	Lines of Enquiry	Indicators	Source
	3-9) What is the financial cost? What is its source? Is that source secure?	• IP costs relative to overall costs of R&D activities • Funding source • Terms of the funding source	• Level of effort and cost of assessing, licensing, marketing and providing awards to inventors (O&M costs + contracting costs, cost of departmental legal services, cost of court challenges etc.) over revenue generated from IP	• File review • Budget review • Budget support documentation review (e.g. TB submissions and decisions, consideration of vote allocation)
4) Lessons Learned	4-1) How do EC's objectives, policies, processes, institutional arrangements and products compare with best practices of other science and research-based departments?	• Comparison with EC and other science and research-based agencies	• Budget comparisons • Manager satisfaction with IPM and IPM services	• Interviews with OGD staff
	4-2) What practices set EC ahead of its peers?	• Best practices, success stories	• List/count of exemplary practices and their impact	• Interviews with IP staff and Managers • Interviews with OGDs

Annex B: Documentation Reviewed

The following documents and material were reviewed in the course of this evaluation:

Document or Reference material	Source
General Background Information	
A Technology Transfer Decision Framework for Publicly Funded Research Organizations	Federal Partners in Technology Transfer
FPTT Annual Reports 2001–2002, 2002-2003 and 2003-2004	Federal Partners in Technology Transfer
Geospatial Web Services: An Evolution Of Geospatial Data Infrastructure – Dissertation discussing exchange of geospatial data IP	Athanasios Tom Kralidis
Guiding Principles For The Management Of Intellectual Property Issues - A Summary Report (September 1997)	Federal Partners in Technology Transfer
Innovation In Canada Web Site	Government of Canada (various, mostly Industry Canada)
Intellectual Property and Research Staff	CAUT Legal Review, Vol. 4, Number 3
Organizational Structures And Practices Used In The Management Of Intellectual Property In Science-Based Organizations with Geographically Separated Research Centres - Executive Summary, August 21, 2001	Stargate Consultants Limited
Environment Canada Documentation	
A Competitiveness and Environmental Sustainability Framework – Draft presentation deck (Feb. 2005)	Within EC
Awards Policy For Inventors And Innovators	Within EC
Delegation of Authority, Section 7.4 Intellectual property	Within EC
Evaluation of Environment Canada's Protection and Commercialization of Computer Software and Technologies Request for Proposals document (2005)	Within EC
Intellectual Property Policy (Draft 10 May 1999)	Within EC
Intellectual Property Policy (approved version, 1996)	Within EC
Working with Others: Policy on Revenue and Collaborative Arrangements (December 2000)	Within EC
Report Template for Evaluations	Audit and Evaluation Branch
Acts of Parliament and Central Agency Guidelines and Guidance	
Agriculture and Agri-Food Canada - A New Crop: Intellectual Property in Research	Reports of the Office of the Auditor General
Canadian Environmental Protection Act (1999)	Department of Justice website
Collaborative Arrangements - Issues for the Federal Government (1999)	Reports of the Office of the Auditor

Document or Reference material	Source
	General
Copyright Act	Public domain
Department of the Environment Act (1985)	Department of Justice website
Industry Portfolio - Investing in Innovation (1999)	Reports of the Office of the Auditor General
Management of Science and Technology Personnel - Follow-up	Reports of the Office of the Auditor General
Patent Act	Public domain
Public Servants Inventions Act and Regulations	Public domain
Science and Technology - Overall Management of Federal Science and Technology Activities	Reports of the Office of the Auditor General
Documents from Other Government Departments and Agencies	
A Risk Assessment of Intellectual Property Management in NRCan	Natural Resources Canada website
Commercialization In Federal Science-Based Departments And Agencies, 2002-03	Statistics Canada Innovation Analysis Bulletin Catalogue Number 88-003-XIE Vol. 7, No. 1 (February 2005)
The Dissemination Of Government Geographic Data In Canada - Guide To Best Practices Winter 2005, Version 1.2	Geoconnections (a consortium/network of federal agencies)
Research Branch Risk Self Assessment December 2000	Agriculture and Agri-Food Canada

Annex C: Interviewees

The following persons were interviewed during the course of the evaluation:

Interviewee	Organization	Interviewee	Organization
Abraham, Jim	Environment Canada Ontario	Deschatelets-Cullen, Catherine Advisor	Environment Canada Intellectual Property Office
Anderson, Karen Director General	Environment Canada Assets, Contracting and Environmental Management	Everell, Marc Denis Assistant Deputy Minister, MSC	Environment Canada Meteorological Service of Canada
Bass, Brad R Researcher	Environment Canada Adaptation and Impacts Research	Fingas, Merv Chief	Environment Canada Emergencies Science and Technology
Blanchette, Jason IP Officer	Environment Canada Intellectual Property Office	Gagné, Lise Administrator	Environment Canada Intellectual Property Office
Bois, Nicole Special Advisor, IP and Technology Transfer	Environment Canada Business Policy	Graham, Lisa Senior Chemist	Environment Canada Emissions Research and Measurement
Brunet, Gilbert A/Director	Environment Canada Numerical Weather Prediction Research	Gray, Brian Assistant Deputy Minister	Environment Canada Science and Technology Branch
Bullen, Bob Head, Intellectual Property Office	Environment Canada Intellectual Property Office	Grimes, David Director General	Environment Canada Weather and Environmental Prediction and Services
Cianciarelli, Dominic Head, Source Measurement	Environment Canada Emissions Research and Measurement	Hendren, Fred ERMD Chief	Environment Canada Emissions Research and Measurement
Heslop, Lorne Director	Agriculture and Agri-Food Canada Science and Innovation	Paterson, Morna Director	National Research Council Canada Support Operations
James, Lisa Commercialization Officer	Agriculture and Agri-Food Canada Eastern Cereal and Oilseed Research Centre - Ottawa	Paré, Jocelyn Chief, Green Technologies	Environment Canada Green Technologies
Landreville, Mike Advisor	Environment Canada Intellectual Property Office	Rancourt, Julie Counsel	Environment Canada Legal Services
Langlois, Shawn Lawyer	National Research Council Canada	Scharf, Shirley Anne Director	

Interviewee	Organization	Interviewee	Organization
(at the time of the interview)	Legal Services		Environment Canada Technology Strategies Division
Lam, David Project Chief	Environment Canada Water Quality Information Management and Modelling	Sioufi, Antoine Senior Advisor	Fisheries and Oceans Canada Science and Technology Management Branch
Lawrence, John Director	Environment Canada Aquatic Ecosystem Management Research	Stemshorn, Barry Special Advisor to the Deputy Minister	Environment Canada Environmental Stewardship Branch
MacIver, Don	Environment Canada Adaptation and Impacts Research	St-Coeur, Joanne A/Chief	Environment Canada Service Design and Coordination
Marsalek, Jiri Project Chief	Environment Canada Urban Water Management	Turle, Richard Acting Director, ETC	Environment Canada Environmental Technology Centre
Mokhtar, Hani Director General	Environment Canada Finance Directorate	Wirth, Pat Senior Policy Advisor (Formerly of EC IPO)	Environment Canada Clean Air

Annex D: Evaluation Questions, Evidence, Findings and Considerations

The following pages list the evidence, findings and Considerations from each of the Evaluation Questions.

Evaluation Question 1.1: Is the mandate for IP management clearly and sufficiently articulated in founding legislation?

Founding legislation includes the Department of the Environment Act (the act that creates the Department of the Environment) and also the Canadian Environmental Protection Act (CEPA). The mandate for Intellectual Property Management could be articulated explicitly in these acts, or it could be inferred indirectly.

Findings

The founding legislation does not explicitly mandate IP management or technology transfer activities beyond information and knowledge development. Other mandated activities include implicitly the necessity to manage IP effectively in order to fulfill the mandates and it can be stated that, while IP management activities are not specifically articulated in the founding legislation, this situation may be sufficient and acceptable.

Evidence

Two Lines of Enquiry were utilized:

Line of Enquiry	File and Document Review	Interviews
Evidence of the importance of IP management in the Dept. of the Environment Act, CEPA	The *Department of the Environment Act (1985)* does not refer to research activities (the origin of much of the Department's IP). Nor does it directly refer to technology transfer or any IP management activities. The *Canadian Environmental Protection Act (1999)* has some articles that support information dissemination, research and demonstrations of technology.	Intellectual Property within EC arises from a range of mandated activities, including research development, and operations. Examples include monitoring activities, development of software or instruments for internal use, and targeted research activities. (Research Managers and IPO staff) Many mandated activities are best conducted in collaboration with external partners. In many of these situations, Intellectual Property considerations become a critical element in ensuring EC's ability to achieve its own mandate within the context of collaborations. (IPO staff, present and former)
Evidence that IP policy reflects the founding legislation principles	The IP Policy identifies technology transfer as an explicit objective although it is not so stated on the founding legislation The Policy on Revenue and Collaborative Arrangements contains principles consistent with founding legislation in that it places licenses revenue as subordinate to the Department's mandate	Regulatory and policy-related activities could benefit from increased proactive analysis of external IP, such as IP landscaping. (one Research Manager) Mandated activities occasionally require the protection of certain IP, in order to ensure EC's continued rights to use its data and technologies. (Research Managers, Scientists)

The Minister shall …: *promote and encourage the institution of practices and conduct leading to the better preservation and enhancement of environmental quality* - ***Dept. of the Environment Act (1985) Article 5(b)***
The Minister shall …: *b) conduct research and studies relating to pollution prevention, …, and provide advisory and technical services and information related to that research and those studies; …* *e) formulate plans for pollution prevention and the control and abatement of pollution, … and establish, operate and publicize demonstration projects and make them available for demonstration* - ***Canadian Environmental Protection Act (1999) Article 44 (1).***
Environment Canada will only enter into revenue and collaborative arrangements where these activities are consistent with the Department's mandate, priorities and strategic direction … **- Policy on Revenue and Collaborative Arrangements (2000), Section 2**

Evaluation Question 1.2: Do EC's IP policies, processes and institutional arrangements align with the recent organization changes and departmental direction?

Environment Canada is currently in a transition period following a reorganization during the period of this evaluation. This reorganization changed the functional and line reporting arrangements of the Intellectual Property Office (IPO).

Findings

EC's IP policy is not well integrated into current departmental directions and interpretations of mandates. IP management processes are not integrated with other departmental processes and directions.

Functional placement of the IPO close to science-based activities is appropriate. The closer the IPO can be to developers of IP, the more likely it will be to add value. The placement of line accountability of the IPO within procurement addresses an area of concern where the IPO does not provide sufficient advice to contracting authorities. It does not, however, support the mandate as laid out in the IP Policy.

Evidence

Four Lines of Enquiry were utilized:

Line of Enquiry	File and Document Review	Interviews	Survey
Evidence of linkages between IP policies and program activities	The IP Policy supports program activities geared toward improving economic and environmental sustainability through collaboration. The Revenue Policy speaks in broad terms and does not identify any specific strategic direction it supports beyond the "Department's mandate"	An important and increasing range of mandated activities can only or best be conducted in collaboration with external partners. In many of these situations, IP considerations become a critical element in ensuring EC's ability to achieve its own mandate within the context of collaborations. (Research	N/A

Line of Enquiry	File and Document Review	Interviews	Survey
		Managers, Scientists)	
Linkage of IP to corporate strategies	The 2003/04 Report on Plans and Priorities identifies science and technology as the foundation of Environment Canada's agenda. It addresses partnerships but does not describe IP management activities explicitly. The 2004-05 RPP lists the following strategic objective: "to provide strategic and effective departmental management to achieve environmental results".	Linkages are not clear, and there is a strong demand for clarification of the alignment. (all interviewees) Some interviewees also see potential for IPM to play a strong role in contributing to the department's mandate and priorities.	When asked if "Do you consider IP in their strategic plans?" 49% responded "Never" and another 30% responded "Occasionally" (Question 23)
Consideration of other internal influences on IP decision making	N/A	ADMs had differing opinions regarding the intent and objectives of IP management within the Department. In particular, the emphasis on "commercialization" and licensing of technologies varied (3 ADMs).	N/A
Indications of contribution of IP management to the various Boards	The IPO will have a line reporting relationship to Procurement and OPP relationships to several science-based OPPs.	IP arises from a range of mandated activities, including research and operations. Examples include monitoring activities, development of software or instruments for internal use, and targeted research activities. (interviews with IPO staff, research managers, scientists) Procurement-related IPM activities currently comprise less than 0.5 PY of the IPO's 5-6 PYs. (IPO staff) The current activities of the IPO focus on providing advice on patents, licensing, copyright, and trademarks, and on managing the patent and license portfolio and innovators' awards. These services are most frequently provided to science and technology based units within EC (IPO staff, Research Managers, Scientists)	N/A

The Department's IP Policy presents the following two objectives:

transfer suitable technologies which result from ongoing DOE R&D and program activities and thereby,

- *encourage beneficial application of environmental technologies to improve the quality of life for Canadians;*
- *support the sustainable development of Canadian economic activity for increased international competitiveness and job creation;*
- *help support further R&D activity from royalty revenues returned to the originators of intellectual property, and*

promote collaborative arrangements between the Department and Canadian industry and universities and other government organizations, domestically and internationally, for the development and application of environmental technologies. – **Environment Canada IP Policy, May 1999**
The Department has identified those positions that have delegated authority to make IP decisions such as signing licenses and patent applications. The exact wording is: *… will allow Departmental managers to make decisions regarding the signing of: licenses, assignments and other technology transfer arrangements; documents pertaining to patents, trademarks, copyright and awards to inventors and innovators; and any other documents relating to the development and use of Intellectual Property on behalf of the Minister. The individuals exercising this authority should note that the Deputy Minister has assigned specific functions and responsibilities to the Intellectual Property Office (IPO) in matters of management of intellectual property. ... –* ***Environment Canada Delegation of Authority, Section 7.4***

Considerations:

The Department should develop a clear position outlining the fit of IP management activities within is current operating framework. This issue will need to be addressed at the Senior Management levels, involving the DM and a range of ADMs. One option of positioning the fit of IP management activities is to highlight the contribution of IP management towards the achievement of mandated activities, e.g. through the protection of IP for internal use, for dissemination to collaborators and the public, and the role of private sector licensees in achieving environmental or weather-related outcomes.

Organizational arrangements will need to align with the position to be developed.

Evaluation Question 1.3: Are EC's IP policies and objectives consistent with government-wide IP direction, acts, regulations and strategies?

Certain government-wide policies, acts and regulations guide how departments should manage intellectual property. Principal among these is the Public Servants Inventions Act (PSIA).

Findings

In accordance with the PSIA, Environment Canada ensures that inventions are vested in Her Majesty in the right of Canada. Processes are not in place to ensure compliance with the PSIA requirement that public servants disclose all inventions.

Environment Canada is providing awards as outlined under the PSIA and Treasury Board regulations. EC does not give any departmental guidance to managers to help them establish the appropriate awards payment within the broad guidelines established by the PSIA. Revenues are not distributed as per a 1993 Treasury Board directive.

While government directions regarding IP are not clearly articulated, Environment Canada's policies on IP and procedures toward treatment of IP aim to be consistent with existing directives.

Evidence

Two Lines of Enquiry were utilized:

Line of Enquiry	File and Document Review	Interviews
Evidence of linkage with government wide science and technology agenda, innovation agenda, policies and guidelines	There is no overarching IP Management strategy within the Government of Canada. (document review)	Interviewees within EC and OGD highlight the lack of a government-wide IP strategy, varying messages issues by different departments and central agencies and inconsistencies over time (interviews with Mangers and OGDs)
Evaluation of compliance with acts and regulations	Environment Canada has very limited numbers of invention disclosures, most likely well below the actual number of inventions, and as such does not comply with PSIA requirements (IPO data) Awards to inventors range from 10% to 35%, as stipulated in the PSIA regulations and Treasury Board guidelines. (file review) License revenues are used to further research and to cover awards payments and patent maintenance fees. (IPO reports)	Environment Canada staff are aware that inventions are vested with the Crown. (five Researchers asked, all were aware) License revenues are used to further research and to cover awards payments and patent maintenance fees. They are not used to fund technology transfer activities such as marketing and patent mining. (IPO staff)

A1993 directive to Deputy Ministers states that license revenues:

> *… are intended to be used toward the costs associated with incentive awards for technology transfer and other technology transfer activities undertaken by the department of agency. -* ***Retention of Royalties and Fees from the Licensing of Crown-Owned Intellectual Property, Sid Gersberg, Assistant Secretary, Programs Branch, TBS, June 19, 1993***

Considerations:

The Department should develop its own IP management framework to compensate for a lack of direction from Government, and to clarify the role of IP within its mandate.

EC should implement processes to ensure compliance with PSIA requirements for inventors to disclose inventions.

Evaluation Question 2.1: Are planned IP protection or commercialization activities actually being implemented and are they meeting, or likely to meet, articulated objectives?

This question addresses whether planned activities are actually realized. The majority of planned activities should happen and exceptions should have a logical reason, such as the inability to find a licensee, to rationalize why they did not occur. The evaluation considers comparisons between planned and actual activity, achievements of the activities and budget expectations and actual expenditures. Objectives should be established and evaluated for each activity.

Findings

IP activities are generally not planned and their objectives not stated. Therefore, they cannot be properly managed to deliver a well-established outcome to the Department's mission.

Licenses and patents are implemented in acceptable timeframes; most license activities do happen and do provide some benefits.

Evidence

Four Lines of Enquiry were utilized:

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
Comparison of planned versus actual IP protection activity levels	No evidence was found of planned activity levels. Note: this is not abnormal given that IP activity resulting from innovation cannot easily be predicted	Over 90% of those asked stated that they did not consider IP in their strategic planning. (Research Managers and Senior Managers) Commercialization activities are a happenstance of research or operations and not usually as a primary objective. (Delegated Authorities and IPO staff group interview) In a minority of interviews increasing familiarity of some research and operational units with IP management is leading to increased planning activities and to the consideration of IP concerns in earlier stages. (two Research Managers)	When asked of targets existed and were they tracked: 48% of activities had no targets, 36% of activities had targets but were not tracked and only 16% were tracked. (Survey, Question 12) When asked if "Do you consider IP in their strategic plans?" 49% responded "Never" and another 30% responded "Occasionally" (Question 23)	During licensing activities, planned events change due to negotiation. (MAP)
Achievements reviewed against prescribed objectives, plans and processes (actual vs. expected results)	Licenses are accurately tracked for payment schedules and renewal dates. (file review) Patents are generally well tracked. Once instance of a missed renewal date was noted (file review)	Licenses arrangements often vary from their intended objective once negotiation begins with private sector or NGOs (interviews, case studies) EC utilizes the services of patent agents to ensure that patent renewals and payments are made according to schedule. (IPO staff)	The note on Survey Question 12 above applies to this Line of Enquiry also.	Objectives for licenses were established and licensees were not renewed based on performance (MAP, POSS) Licensing terms did not prove effective in encouraging licensees to invest in and advance the technology (POSS)
Comparison of planned versus	No evidence was found of planned	IP management activities such as licenses or patent application	N/A	

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
actual activities in the areas of business development, legal advice	activities in business development or legal services. (file review)	most often do not have accompanying objectives beyond IP protection. (Legal and IPO staff)		
Human and Financial resource allocation	IPO funding allocation has been fairly level for the last ten years (file review) No central resources are dedicated to technology transfer activities. (IPO organization review) Clients are satisfied with IPO and Legal service offerings when they are engaged (User Satisfaction Survey)	IPO staff feel competent to perform technology transfer and business development roles but are under-resourced and not mandated to do this work (IPO staff group interview) Researchers and managers noted high turnaround in IPO Manager and staff positions.	N/A	The level of support for technology evaluation and licensing activities was not sufficient in all 3 case studies.

Considerations:

The Department should develop a template for license, patent, copyright and trademark registration activities that includes specific and measurable outcomes and benefits (e.g. number of installations a license should implement) and ties this to departmental objectives.

Evaluation Question 2.2: Have the expected environmental, economic, and social benefits of identification, protection, transfer, and commercialization of IP been achieved?

This question addresses whether planned activities produce the intended benefits. These benefits are often derived 10 or more years after the initial invention. The majority of expected benefits should be measured and realized. Benefits should be identified and tied to the Department's mandate and mission.

Findings

Expected benefits are not articulated and therefore cannot be managed. IP protection has not always been effective, as the Department does not prosecute infringement.

Evidence

Three Lines of Enquiry where utilized: ·

Line of Enquiry	File and Document Review	Survey	Case Studies
Identification of economic and social benefits·	Benefits from IP protection and commercialization are not systematically identified and evaluated. (file review, supported by interviews, survey, case studies)	34% or respondents felt that their IP generating activities resulted in less pollution. (Question	Some environmental benefits (e.g. reduced solvent use) have been achieved. (MAP, B-12)

Line of Enquiry	File and Document Review	Survey	Case Studies
		11)	
Evidence of how the IP has supported the Department's mission/mandate	Requests for assistance or action in IP management are not accompanied with objectives statement that ties it to benefits (file review)	42% or respondents felt that their IP generating activities resulted in better service to Canadians. (Question 11)	
Comparison of planned versus actual IP outcomes	No social benefits were identified resulting from IP management activities. Social changes were not identified as objectives or measured. Social benefits could include such things as changed behaviour in the public or improved standard of living. (file reviews) The Department does receive a significant amount of financial revenues from licenses of up to $1.7M/year. (IPO files)		Patents have been infringed upon; some of these infringements have been turned into licenses opportunities, some have been ignored. (MAP)

Evaluation Question 2.3: What secondary benefits, unintended results or liabilities have arisen from EC's management of IP?

This question addresses any unplanned outcomes or benefits, either positive or negative of the IP management activities. Interviewees and survey responded were asked if they experienced any unanticipated outcomes.

Findings

Benefits extend beyond those indicated by monetary contributions or the leveraging of public sector marketing capabilities.

IP management activities require substantial efforts on the part of scientists, occasionally resulting in negative impacts on mandated work. Some negative consequences relating to the awards program and the lack of clarity with regards to objectives were noted.

There is a risk of EC entering into contracts and assuming liabilities beyond those approved by the appropriate managers. Examples of these risks include requirements to use a specific contractor who retains IP or assuring a level of support and resourcing for the licensed technology.

Evidence

One Line of Enquiry was utilized:

Line of Enquiry	Interviews	Case Studies
Evidence of unexpected impacts both positive and negative	IPM activities conducted by scientists can divert from mandates and can be an inefficient use of resources. For example, scientists can spend inordinate amount of time negotiating license agreements. (two Researchers/Research Managers) Some interviewees expressed resentment at levels of award payments. The awards program has had some negative impact	Appropriate technology transfer has elevated the scientific profile of the Department, also leading to increased opportunities for collaboration. (MAP, B-12, POSS)

Line of Enquiry	Interviews	Case Studies
	on morale or office camaraderie. In a number of different instances, scientists have found that their motives were questioned after conducting what they perceived as mandated activities at the time. (Researcher/Research Managers, IPO staff) Increased awareness of markets has lead to higher quality S&T efforts and more relevant S&T outputs. (scientists)	

Evaluation Question 2.4: Who are the external users of IP generated by the Department?

This question is not evaluative in nature. It asks with whom the Department licenses and shares IP. This was obtained primarily from the survey and file reviews.

Findings

Survey respondents were asked to identify their external users of IP. The following table lists their responses; the percentages shown are the percentage of respondents who identified the user community as one of their clients:

User Community	**%**	**User Community**	**%**
EC – Operations	55	Other levels of Government	57
EC – Policy function	49	Canadian Government (OGDs)	54
EC – Regulatory	48	Other country governments	32
Canadian universities	48	Foreign universities	25
Canadian companies	39	Foreign companies	16
Canadian NGOs	39	Foreign NGOs	31
Canadian public	44	Foreign public	10

Evidence

One Line of Enquiry was utilized:

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
Evidence of the uses and application of IP at different levels. (e.g. (provincial/territorial, national, international, private sector)	Licensing is done primarily to the private sector. (file review) Data on collaborations is not captured. (file review)	In many cases, the public and/or NGOs are stakeholders whose interest need to be considered in the development of IP strategies. (interviews with Managers and Scientists)	There is substantial interaction between the IP user community (departmental clients) and EC staff. (Question 14, 60% are in contact at least monthly) 60% of survey respondents are in communication with external partners at least monthly. Most of the communications are not tracked. (survey and interviews) Researchers are often unaware of the Departments IP Policy despite being involved with outside parties in IP negotiations. (Questions 19, 21 and 25)	Private sector was the recipient of all cases, end users include scientists, the U.S. government, companies, and others. (MAP, POSS, B-12)

Considerations:

Environment Canada develops an approach to ensure IP issues are addressed consistently in all interactions with external users of IP and that the IPO is involved whenever an external party is engaged. Special attention needs to be paid to collaborations and arrangements relating to IP in the form of data.

Evaluation Question 3.1: What are the IP related roles and mandates of scientists, senior managers, decision-making committees and the Intellectual Property Office and are they appropriate?

Managers (Delegated Authorities) and scientists have IP management roles but are not acknowledged subject matter experts on IP management (except by happenstance). The training and information activities that help them carry out these duties will be examined in the question.

Findings

The role of Delegated Authority is not fully articulated in the Delegation of Authority instrument. No consistency is applied across Delegated Authorities for their decision-making, as they do not work from a consistent knowledge base or established guidelines (as compared, for example, with leave authorization guidelines). Scientists are not adequately trained, supported, or mandated to conduct bulk of technology transfer activities in which they are currently engaged

Evidence

Three Lines of Enquiry were utilized:

Line of Enquiry	File and Document Review	Interviews	Case Studies
Process to be followed in deciding direction and extent of protection and commercialisation of IP.	The IP Policy basically identifies three groups of individuals: Delegated Authorities; other scientists (or similar) and managers; and IPO staff. (document review)	The Delegated Authorities, as per the IP Policy, sign licenses and contracts for patent activity. (IPO staff) Scientists generally perform all tasks related to the transfer of data or technologies, such as marketing, evaluation of technologies or data, and negotiations. (four scientists and IPO staff)	No process was followed, all decisions were "one off" using best judgement (MAP)
Roles and responsibilities identified in decision making processes.	The IPO is tasked to: maintain IP expertise; maintain IP information (e.g. number of licenses); report annually to the DM on technology transfer activities; and, provide specialized services on a cost recovery basis. (IP policy review)	N/A	N/A
Rationale for arrangements, logic for centralization vs. decentralization of IP function.	Delegated Authorities and scientists do not require any mandatory training and do not have to follow any pre-established guidelines with regards to IP management activities. The requirement to consult the IPO is framed with the word "should" and does not articulate the conditions that would make that recommended.	The IPO tracks license funds received and award payments. It does this working with Finance and in response to its mandate from the IP Policy to report to the Deputy Minister on IP management activities. The IPO also provides advice on all aspects on IP upon request. (IPO staff)	N/A

The Delegation of Authority instrument does not spell out detailed responsibilities. It only identifies a few examples. The exact wording is:

> … will allow Departmental managers to make decisions regarding the signing of: licenses, assignments and other technology transfer arrangements; documents pertaining to patents, trademarks, copyright and awards to inventors and innovators; and any other documents relating to the development and use of Intellectual Property on behalf of the Minister. – **Environment Canada Delegation of Authority, Section 7.4**

Delegated Authorities are advised in the IP Policy to involve the IPO. The exact wording and emphasis provided in the document is:

> *…. The individuals exercising this authority should note that the Deputy Minister has assigned specific functions and responsibilities to the Intellectual Property Office (IPO) in matters of management of intellectual property.* ***Individuals should consult the IPO prior to exercising their authority*** *– **Environment Canada Delegation of Authority, Section 7.4***

Considerations:

Environment Canada articulate specific responsibilities to the Delegated Authorities in the Delegation of Authority instrument and that conditions be made where IPO consultation is mandated (as opposed to advised)

Introduce a business development / technology transfer / liaison function to relieve scientists of the bulk of the activities associated with these activities.

Evaluation Question 3.2: What activities are undertaken to inform and support managers and scientists in the identification and management of IP?

Managers (Delegated Authorities) and scientists have IP management roles but are not acknowledged subject matter experts on IP management (except by happenstance). The training and information activities that help them carry out these duties will be examined in the question.

Findings

Communication of IP responsibilities to Delegated Authorities has been inadequate. The IPO does not conduct sufficient proactive information dissemination activities to EC staff in general. When training was done, it was extended to regional offices. Although not specifically evaluated, no evidence was found to suggest that there were any official language problems with information and IP awareness training.

Evidence

Two Lines of Enquiry were utilized:

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
Breadth of dissemination activity.	No materials exist that explain the responsibilities of Delegated Authorities beyond what is contained in the Delegation of Authority instrument. The toolkit identified as forthcoming in the Policy on Revenue and Collaborative Arrangements was not in evidence.	Information and training sessions are occasionally held, yet have had limited reach. (three Research Managers)	In the survey, only 14% of respondents indicated that they had received IP training. (Question 17) Almost half the respondents were unaware of the IPO and therefore unlikely to engage them. 75% of survey respondents were unaware if their area had a policy regarding information disclosures, a key step in the identification of IP. (Questions 33, 34, 35)	N/A
Comparison of planned versus actual of training and awareness activities.	When the IPO is engaged, their clients report good support from knowledgeable staff. The IPO has conducted user satisfaction surveys and these receive positive client feedback. (User	Information and training sessions have not been restricted to the NCR; the IPO has conducted sessions in regional offices	In the survey, the majority of EC staff was unaware of the services and responsibilities of the IPO. (Question 35)	At the time POSS was originally developed, there was not sufficient information and support

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
	Satisfaction survey supported by IPO staff interviews)	and laboratories. (IPO staff)		available resulting in a missed opportunity to patents. (POSS)

Considerations:

The IPO be directed and staffed to conduct more communications activities regarding their role and services and the responsibilities of Delegated Authorities.

Evaluation Question 3.3: Are EC's policy objectives, strategies, etc. to manage IP sufficiently documented and understood within the Department?

The understanding of objectives and strategies for the management of IP by decision-makers and EC staff in general is evaluated. Two aspects are considered, the overall knowledge and understanding of strategies and objectives and the correctness of that understanding when compared to departmental policy.

Findings

The Department has done a poor job of documenting IP policy objectives (likely due to lack of management attention in this area). The existing policy may or may not be in force and in any regard is not well know outside of the IPO. Departmental IP policy is not well understood.

Evidence

Two Lines of Enquiry were utilized:

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
Breadth of dissemination activity	The IP Policy is marked "Draft" and dated May 1999. The evaluation team could not find a definitive response as to whether or not the policy has been signed and is in force. No interviewee mentioned the Policy on Revenue and Collaborative Arrangements. The document has no signature or "in force date".	see above	Most survey respondents were unaware of the objectives of IP management within the Department and the IP Policy. (Questions 21, 23, 25 and 35).	see above
Prescribed	The IP Policy clearly	Most interviewees outside	Only 11% were	The activities for IP

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
definition vs. the interpretations of managers and scientists	explains objectives of IP management. These objectives are not linked. The Delegation of Authority instrument does not explain the overall objectives of IP Management within the Department. (Delegation instrument)	of the IPO were unaware of departmental position on IP and expressed that it was poorly articulated to them. Their understanding of policy and objectives is poor and inconsistent. (most Researchers /Research Managers) The extent of changes in articulated strategies and objectives and in their interpretation over time lead to difficulties in the context of managing long-term S&T activities. (interviews)	aware of the invention disclosure policy (Question 33)	exploitation have suffered in all three cases from a lack of consistency in the interpretation and perception of managers with regards to IP management. (MAP, B-12, POSS)

Considerations:

The IP Policy should be updated to better clarify roles and responsibilities, re-issued and promoted along with revisions to the Delegation of Authority instrument.

The Department should develop communications materials regarding the IP Policy. This material should include copies of the policy, interpretations of various aspects of the policy as appropriate, information about Delegated Authority's responsibilities and contact information for the IPO.

Evaluation Question 3.4: Are sufficient tools internally available to efficiently support the management of IP?

Findings

Insufficient tools exist to support Delegated Authorities in the management of their IP related duties. Scientists and EC staff in general need additional resources such as guides to tell them when to complete an Invention Disclosure. Information management tools and systems within the IPO are adequate to serve their requirements.

Evidence

One Line of Enquiry was utilized:

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
Existence of guidelines, indicators, decision criteria and technology tools. (e.g.	There was no evidence of any guidelines, toolkits, templates, etc. made available to Delegated Authorities or interested parties; no standard resource material exists.	IP training sessions have been held in various locations occasionally but participants are not left with a training manual or guidelines. (various interviews)	Only 14% or respondents were aware of any tools to support them in IP Management (Question 19)	In all three cases, Scientists relied heavily on informal sources of information with regards to IP, including experience

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
databases)	Technology systems to support the IPO are well established. These tools include registries of patents, licenses, trademark registrations, etc along with correspondence files. (document review supported by interview with IPO staff) There was no evidence of tools or guidelines borrowed from other agencies such as the National Research Council.	Delegated Authorities were unaware of their responsibilities and role of the IPO or of any materials that would explain this to them (two Delegated Authorities) Technology systems to support the IPO are useful. (IPO staff)	Only 21% felt that they needed tools to support them in IP Management. (Question 20)	from previous employment, external colleagues and self-directed learning. (MAP, POSS, B-12)

Considerations:

The IPO develop a toolkit for Delegated Authorities outlining their responsibilities and providing them with templates, guides and checklists as appropriate. This toolkit should include the following types of elements:

a) Process diagrams for common activities such as applying for a patent;

b) Checklists to allow decision makers to know when a file is sufficiently complex that it requires IPO involvement;

c) Samples of successful licenses, patent applications, letters to prospective licensees, etc;

d) Reference cards with contact information for the IPO and Legal Services Unit; and

e) Descriptions of roles, responsibilities of the IPO, scientist/inventor and Delegated Authority and a summary of the IP Policy.

EC leverage materials from OGDS such as the FPTT's current efforts to develop an "FPTT Desk Reference" and workshops.

Evaluation Question 3.5: Is sufficient and appropriate IP management performance information captured, monitored and reported? Is this information used?

The evaluation looked at the management information that is captured and reported to decision makers and whether that information is effectively used in the decision making process. Decision makers should have the appropriate information in their hands at the proper time for it to be effective and in a fashion that allows for proper interpretation and application of the information.

Findings

Management reporting is not consistently done for responsibility center managers and is generally not done at all. Therefore managers do not use IP management information in broad decision making (e.g. strategies) but they do use it in a case-by-case basis.

Evidence

Three Lines of Enquiry were utilized:

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
Performance information captured and reported.	Revenues from licenses are tracked along with counts of IP files (e.g. Trademarks) within the systems at the IPO. This management information is only reported to TBS, the DM, and Statistics Canada. The capability exists within IPO to produce reports (e.g. revenue by responsibility centre), but this is not promoted and is rarely requested. (document review supported by IPO interviews)	License and patent due dates are tracked by the IPO and patent agent. (IPO staff and one Research Manager)	When asked if performance information is tracked, 48% said it was not tracked and 36% said it was tracked but there were no targets. (Question 20)	There are no reporting requirements with regards to ultimate impacts in the licensing arrangements reviewed. In the B-12 case, substantive feedback with regards to the performance of the technology is obtained.
Evidence of fact based IP decision making.	The evaluation team saw no evidence of reports to executive committees or senior management	Patent management costs are tracked although it is possible for organization to contract for patent activities without the IPO's awareness. This is, however, unlikely. Patent costs are available to Delegated Authorities on a case-by-case basis and upon request. This is not a routine informing done by the IPO. (IPO staff)		While all Scientists involved in the case studies have made efforts to make decisions based on the best information available, there is no systematic approach available to ensure the quality of such decisions. (MAP, POSS, B-12)
Actual vs. expected information and use of information in planning, decision-making processes.	Existing measures are not sufficient to allow for their effective use in decision-making. (document review)	IP related information is generally not used in decision-making. (various interviews)	When asked "How frequently do you use IP performance information in your decision-making?", 50% said rarely and another 26% said only occasionally (Question 25)	The use of such information improved as experience was gained over time. (MAP, POSS, B-12)

Considerations:

Routine IP activity and cost reports be developed and delivered to program area managers.

Addition measures need to be developed and captured to contribute to improved decision-making.

Evaluation Question 3.6 Is sufficient IP expertise available and who is providing it?

IP functions require the requisite expertise be available, that it have the right capacity, is organized to provide service to its clientele and that it covers all the necessary skill sets as dictated by the objectives established in the IP Policy.

Findings

Central expertise within the IPO is sufficient to meet the needs of the Department; Legal Services expertise is sufficient. Delegated Authority expertise is lacking and inconsistent and needs to either be supplemented by more proactive support in labs and research program areas or augmented by better training. Business development expertise (e.g. marketing) is untested; resource levels do not permit active marketing of technologies; this also applies to patent landscaping, negotiating, technology assessment etc.

Evidence

Two Lines of Enquiry where utilized:

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
Confirmation that services have capacity to reach clientele, no major flaws in logic or design inhibiting achievement of results.	No restrictions noted on IPO access to clientele (file and correspondence review)	Delegated Authorities and scientists have no formal IP training and expertise varies and is by happenstance. They play a key role in provision of IP expertise at the local level. (Research Managers supported by all three Case Studies)	Only 6% of respondents were aware of IPO services. (Question 35)	IP management advice is provided by the IPO, Legal Services (often coordinated through the IPO) and from experienced peers. (MAP, POSS).
Coverage of IP expertise skill sets as compared to other science based departments.		Within IPO, expertise in all relevant areas exists although technology transfer and marketing skills have not been fully tested, as the IPO currently does not do this activity. Technology transfer activities are not provided by IPO due to resource levels. (IPO Focus group/interview)	Only 5% of respondents have contracted outside IP management assistance (Question 28)	Research Manager had to go to colleagues in OGDs for assistance. (in 1990's) (MAP)

Considerations:

Training for Delegated Authorities be developed and delivered and made mandatory for exercising of authority.

Evaluation Question 3.7: Was an appropriate selection mechanism followed with timeliness, due diligence and fairness?

The selection methods considered include the methods for deciding to pursue a IP management related project, the selection of partners, the selection of award payments schedules and the selection of the method of commercialization (e.g. license, publish, partner). An appropriate selection mechanism implies risk analysis and cost/benefit analysis for proposed activities involving IP such as licensing or patent application.

Findings

Guidelines on percentage of awards to offer inventors do not exist and their absence negatively impacts the perceived fairness and openness of awards decisions. An IPM management framework does not exist; neither does formalized decision criteria for decisions currently taken. The Department is unable to defend decisions taken in IP management.

Evidence

Three Lines of Enquiry were utilized:

Line of Enquiry	File and Document Review	Interviews	Case Studies
Method of selection of partners; criteria considered.	No evidence was found of formal evaluation of potential partners. (file review)	Allocation of award payments is done at the project team level, with all involved determining the appropriate proportion. The decision on how much of the license fee to allocate for award (from 10 to 35%) is made by the Delegated Authority and this amount varies by program area and type of IP being protected. (IPO staff, several Researchers/Research Managers)	Partner selection was done by the Research Manager using a variety of external tools such as Trade Shows. (MAP)
IP Solicitation and evaluation/selection methodologies.		No formal mechanism exists departmentally to determine whether licensing is appropriate. Delegated Authorities make that decision independently using their best judgement and advice they receive. (IPO staff and two Research Managers)	
Evidence of thorough review appropriate to financial risk and benefit.	No evidence was found of formal evaluation of risks. (file review)	Interviewees did not feel a mechanism was needed to select projects for commercialization as this function is done only occasionally. (two Research Managers, two senior executives)	

Considerations:

Develop and implement an IP management framework to assist decision-makers and provide a context to support IP management decisions such as not pursuing a patent. This framework would include:

- Strategic objectives to compare options against (e.g. priority given to air quality activities);

- Accepted departmental principles applied to IM (e.g. do not allow restrictions on EC's use of IP in license agreements, or will not license to non-publicly traded private sector firms);
- Risk evaluation criteria and process;
- Cost/benefit approach and criteria;
- Performance indicators for licenses and IP protection activities; and
- Routine activity to evaluate performance of suite of licenses and patents.

Evaluation Question 3.8: Were the appropriate mechanisms (e.g. patent, publication, licensing) selected to both protect and leverage the department's IP?

The Department has a variety of possible mechanism to protect and leverage its IP on every case it decides to pursue. It can publish or use various protection mechanisms, develop portfolios of collaborations and licensing agreements, of build special interest groups and informal associations with external stakeholders around Intellectual Property. This question evaluates those decisions to see if the best choice was made to serve the Department's mission and whether or not alternatives were considered.

Findings

There are no formal processes to identify arising IP. Decisions are made by individuals who are not experts in this area, often without sufficient training (see above), and with no requirement to consult with IPO staff. There are no consistent criteria or approaches across the Department toward the decision-making process on what mechanism to select. Notwithstanding the above, the decisions taken were generally perceived as acceptable, logical and there were few serious concerns about potential blunders.

Evidence

One Line of Enquiry was utilized:

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
Profile of instrument selections and indications of consideration of alternative mechanisms.	There is no documentation outlining decision processes and criteria. (document review)	Most researchers feel the proper decisions had been taken and few concerns were raised about improper mechanisms selected. On at least one occasion, a group published without realizing that that action prevented them from future patent action. The decision ended up not hurting the situation. (Researchers and Research Managers)	Decisions to publish are not subject to IP reviews and are done by local managers (publishing can result in loss of IP protection). Only 10% of these decisions are made at the DG level. (Question 13) Invention Disclosure policies are either	Scientists / Researchers make decisions based on own experience and that of colleagues. (all case studies) In the case of POSS, IP was not protected before publication, which resulted in the group's inability to obtain a patent at a later date. It is likely that the lack of a patent contributed to the limited success in finding a partner

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
			not in place or not known in program areas. Only 10% of respondents were aware of their area's disclosure policy. (Question 33)	who was willing to deliver on the department's expectations. (POSS)

Considerations:

In development of training and information materials for Delegated Authority, include information on all mechanisms available, the potential synergies, conflicts, and implications relating to decisions to protect and publish, and criteria for the selection of certain mechanisms over others.

Develop criteria for situations in which IPO advice should be mandatory and formalize processes through the Delegated Authority tool.

Evaluation Question 3.9: What is the financial cost? What is its source? Is that source secure?

Mission critical activities such as asset management (IP is a departmental asset) require secure and sufficient funding. The funding should also be appropriate

Findings

Funding levels do not allow for support in business development activities such as marketing, negotiation, and technology assessment; or for patent analysis for management and policy purposes. Funding model does not use central funds to encourage corporate behaviour (e.g. patent evaluations). Funding is secure (i.e. comes from A-Base, not discretionary funds).

Evidence

Three Lines of Enquiry were utilized:

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
IP costs relative to overall costs of S&T activities.	Operating cost of IPO has been fairly level and A-base funded. The IPO has had a salary budget for 4 - 6 persons and small discretionary O&M funding. The IPO has invested in staff training to a suitable level. (document review) Funding levels are	Although they are not very high in relation to S&T activities, O&M budgets are very limited in many groups and such expenses are often difficult to justify. (Interviews, case studies)	Cost and funding information derived from the survey is not complete or reliable. Crude cost estimates from the survey would put IT Management costs at less than 10% of research	O&M costs have been difficult to obtain at certain periods within the life span of all three case studies.

Line of Enquiry	File and Document Review	Interviews	Survey	Case Studies
	minimal as compared to EC's S&T budget. (document review)		costs. (Question 26)	
Funding source	The IPO is funded from A-Base.	The program areas fund most patent O&M activities; revenues come into the cost centres of the S&T group licensing the technology / data. (IPO) Indirect costs in terms of employee time commitments far outweigh direct costs. (interviews with scientists and research managers supported by case studies)		The program areas fund most patent O&M activities; revenues come into the cost centres of the S&T group licensing the technology. (interviews, case studies) Indirect costs in terms of employee time commitments far outweigh direct costs. (MAP, POSS, B-12)
Terms of the funding source.	Funds only cover IPO staff, and some patent related expenses. (document review)	Lack of corporate funding has occasionally caused some Delegated Authority to not pursue patent activities. (IPO staff) The strong role of S&T groups in funding IPM activities also results in a relatively high level of autonomy, which has led to conflicts in the past. (one executive interviews supported by case studies)	N/A	The strong role of S&T groups in funding IPM activities also results in a relatively high level of autonomy, which has led to conflicts in the past. (MAP, POSS, B-12)

Considerations:

Identify corporate desired behaviour and develop a discretionary fund to encourage Delegated Authorities to perform these activities.

Provide corporate funding for marketing, negotiation, technology assessment and patent analysis functions.

Evaluation Question 4.1: How do EC's objectives, policies, processes, institutional arrangements and products compare with best practices of other science and research-based departments?

The findings and evidence reported below only refers to practices that work well within contexts that are similar to those faced by Environment Canada.

Findings

- Similar to EC, other OGD have difficulties to the lack of or frequent changes in government directions regarding IP. Where this issue has been addressed, this has been achieved through the development of internal (departmental) policies.
- The organizational arrangements for IP management often include a combination of centralized IP management staff and embedded business development experts.
- Timeliness and streamlined decision processes are a key success factor in IP management.
- There are instances, in which the objectives of interactions with external partner have been integrated into a framework of regulators and policy priorities. Such an approach could be built upon by Environment Canada.
- Best practices regarding the identification of IP involve the review of proposed scientific articles prior to publication, for example in a committee approach, backed by sufficient resources (in terms of staff and funding) to efficiently act on IP management decisions.
- There are a number of initiatives under way in which frameworks or reference material for certain aspects of IP management are being developed. The use of templates for legal agreements (to be used by licensing experts, not scientists) is a well-established best practice in a number of OGD.

Evidence

The following evidence was obtained through interviews with officials of OGDs.

Responses to a question regarding government IP directions and strategies generally made it clear that there is no overall government direction with regards to IP, and in particular not one that is stable over time frames of relevance to science and technology. Where interviewees did cite government priorities the answers varied substantially. This seems to be an issue across government, although some departments seem to mitigate the effects with clearer internal policies.

In most OGDs technology transfer specialists are responsible for business development, liaison, and negotiation tasks, in collaboration with scientists. Only departments with smaller volumes of collaboration, licensing and other agreements tend to combine the technology transfer and IP management function.

Many OGDs have established a combination of central and decentralized organizational structures for IP and TT functions, often changing over time.

It seems that a key success factor in IP management is the ability to make decisions in a timely fashion. Matrix organisations, and organisations requiring a number of senior-level sign offs on decisions have had difficulties in establishing responsive decision processes. Involving legal counsel early on in the process of establishing relationships with external partners also facilitates timely and high-quality agreements.

One example of a clear link between regulatory / policy functions and technology-based collaborations is the Research Partnership Strategy by the CFIA, based on a similar model within AAFC, the Matching Investment Initiative.

It is also to be noted that a number of OGDs report concerns about the timeliness of decisions. This concern has not been raised among the interviewees at EC as a major concern.

The Federal Partners in Technology Transfer have developed a decision framework for Technology and Knowledge Transfer decisions, and are currently developing a "Desk Reference" document and a series of workshops for a range of audiences including technology transfer / IP management officers, scientists, and science and senior managers.

The National Research Council (NRC) has recently developed a framework for IP management. Elements of this framework have been in use within the Biological Research Institute (NRC) for some time and with promising results. A key element of this latter process is a committee approach to identifying IP, for example in proposed publications. EC staff have expressed interest in such a system.

Templates for legal agreements have been used successfully within a number of departments. As well, there is a recently established intranet-based information portal for Justice Lawyers working on such agreements. A Justice lawyer involved in the project, Ms. Rancourt, is now working for Environment Canada.

Considerations:

Establish a combination of central and decentralized organizational structures within IP and technology transfer functions to address the requests for embedded technology transfer professionals. Develop an IP management framework based on IP management objectives (to be established) that explicitly integrates collaborations, licensing, and other IP management activities into the context of mandated activities.

Establish processes that will encourage the early involvement of EC's legal advisors.

Evaluation Question 4.2: What practices set EC ahead of its peers?

Findings

Despite the above-mentioned shortcomings in the process of IP management within Environment Canada, the following aspects seem to work better at EC than in a range of OGDs. Efforts should be made to maintain these strengths.

- Relationships between the IPO and many scientists and managers seem less strained than in certain other government departments and agencies.
- The information management practices within the IPO are well established and effective.
- There currently is a high level of awareness among EC senior management relating to IP management and the requirement for improvements.

Evidence

One Line of Enquiry was utilized:

Line of Enquiry	File and Document Review	Interviews
Best practices, success stories.	There seem to be less tension between the IPO and the science community than in certain other OGD. (file review, interviews with scientists and IPO staff) The IPO uses technology effectively to support information management within the IPO. (file review, interviews)	IPO staff enjoys a relatively high level of credibility among their client base (interviews) The IPO uses technology effectively to support information management within the IPO. (file review, interviews) There is broader awareness of Delegated Authorities within EC than in certain other SBDA. (interviews with EC staff and OGD)

Considerations:

No recommendations arise from this question.