OPTIONS PAPER

Identification of Options for an Information Management System (IMS) for the Mackenzie Valley Cumulative Impact Monitoring Program (MVCIMP)

Prepared for:
The MVCIMP Working Group
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Introduction

An information management system (IMS) will be developed for the Mackenzie Valley Cumulative Impact Monitoring Program (MVCIMP) which addresses the need for Cumulative Impact Monitoring (CIM) information to be coordinated at the Mackenzie-Valley wide level, while respecting regional systems, governments, and institutions established under existing or pending land claim and self government agreements.

The objective of this study was to identify and evaluate options, and recommend a strategy for developing an NWT cumulative impact information management system (IMS) which meets the following requirements: 1) the system will include nodes (authoritative sources) and a single territorial hub to facilitate information flow between the nodes; 2) responsibility concerning access to and quality of information will rest with the nodes; 3) the information to be managed will include: monitoring activities and research projects, geospatial data/systems, and publications, studies, and reports; 4) the information to be managed will include both traditional and scientific knowledge; 5) the system should encourage standardization of data access and presentation; and 6) the system should facilitate sharing of information beyond the NWT.

The MVCIMP Working Group identified a survey as the first step in designing and evaluating options for an effective MVCIMP IMS. This paper reports on the results of that survey, uses the issues raised in the survey to inform the discussion of the options for an MVCIMP IMS, and identifies a preferred option.

Methodology

The Statement of Work (SOW) for this study set out 6 tasks to accomplish the process of identifying and evaluating options, and recommending a strategy for an MVCIMP IMS (which the Project Team followed). These included:

- Identifying the potential nodes of a Cumulative Impact IMS;
- Developing an interview protocol for consulting representatives of the potential nodes;
- Interviewing representatives of the potential nodes;
- Reviewing Hub models suggested by the Working Group;
- Developing initial options for an MVCIMP IMS, and analyzing each option; and
- Identifying a preferred option.

Survey Results

Sixty-six (66) surveys were sent out: 60 to potential nodes, and 6 to hub examples. The survey was sent to all major stakeholders within the Mackenzie Valley that had an interest in CIM:

- The Government of Canada (Department of Indian Affairs and Northern Development; Department of Fisheries and Oceans; Environment Canada; Natural Resources Canada);
- The Government of the NWT (Resources Wildlife and Economic Development; Health and Social Services – Contaminants Unit);

- Aboriginal governments (including Akaitcho Treaty 8; the Deh Cho First Nations; Dogrib Treaty 11; the Gwich'in; the Inuvialuit; the North Slave Metis; the Sahtu; and the South Slave Metis);
- Co-management boards (in the Gwich'in, Inuvialuit, and Sahtu land claims regions);
- Territorial environmental permitting and review boards (Mackenzie Valley Land & Water Board; Mackenzie Valley Environmental Impact Review Board);
- Non-governmental environmental agencies (Canadian Parks and Wilderness Society; Canadian Nature Federation; Canadian Arctic Resources Committee; Ecology North; Global Forest Watch; World Wildlife Fund)
- The mining industry (NWT Chamber of Mines; BHP; Diavik);
- The oil and gas industry (Canadian Association of Petroleum Producers; Trans-Canada Pipelines); and
- Other important stakeholders (Aurora Research Institute; West Kitikmeot Slave Study).

Thirty-six (36) completed surveys were received back, for a response rate of 55% (and a confidence level of +/- 10%, 19 times out of 20). The response rate is very high for a mail-out type survey, and is likely due to the coordinated efforts of the Project Team and the Working Group.

Survey Analysis

The survey results highlight a number of issues which will guide the development of the options of an MVCIMP IMS, and include:

- the emergence of possible locations for the territorial Hub (in Yellowknife and/or Inuvik);
- the emergence of possible organizations which could host/house the territorial Hub, such as the Government of Canada (especially DIAND, DFO and Environment Canada) and the environmental boards (the MVEIRB, MVLWB and the co-management boards);
- a high level of technical capacity of the potential nodes;
- standardization of programs; and
- the predominance of biophysical CIM.

The survey results also highlight a number of issues which must be addressed before an MVCIMP IMS can successfully be developed, and include:

- the lack of metadata associated with CIM information;
- the low capacity of the potential nodes to share their CIM information;
- most of the CIM information at the nodes is not currently Internet ready;
- the need for additional resources at the node level; and
- systemic/structural issues (such as data sharing concerns).

Limitations

There are two limitations to this study which must be noted, and which include 1) the scope/length of survey; and 2) the lack of industry participation.

Review of Hub Approaches Suggested by the Working Group

The Arctic Borderlands Ecological Knowledge Co-operative site is a well laid-out, summary level source of ecological monitoring information, written for the general public. It's strengths are that it: 1) provides summaries and trends of ecological monitoring information; and 2) that it is written at a level that makes it accessible to a wide range of people (researchers; bureaucrats and the general public). It's weaknesses – in relation to this project (and it's applicability as a possible hub model) – are that: 1) it is not a Hub-Node system (i.e. there are no links back to the nodes who provided the CIM information); 2) it is not a meta-data system; and 3) the raw data that is contained on the site is not in a readily-usable format for other researchers (i.e. it has been translated into summary format and plotted onto graphs, but there are no links to a complete database or spreadsheet). Due to the three weaknesses outlined, the site would not serve as a possible hub model for an MVCIMP IMS.

The northern Ecological Assessment and Monitoring Network (EMAN-North) Information Centre site is a well laid-out, in-depth source of ecological monitoring information, written for researchers and the general public. It's strengths are that it: 1) is an excellent example of a Hub-Node model; 2) is a metadata based system; 3) has links back to the Nodes and the raw data; and 4) provides status and trends summaries of CIM information (i.e. translates technical, scientific information into plain language). The only weaknesses in relation to this project (and it's applicability as a possible hub model) – are that: 1) the metadata formats should be standardized; and 2) the raw data provided by the links should be in a more readily-usable format for other researchers (i.e. it has been translated into summary format and plotted onto graphs for certain days, but there are no links to the complete database or spreadsheet). The EMAN-North Information Centre could serve as a possible hub model for an MVCIMP IMS, as long as the two weaknesses outlined were addressed.

Options

Three options for an MVCIMP IMS are outlined, including:

- a Centralized Hub (Option 1);
- a Regional Hub (Option 2); and
- a Split Hub (Option 3).

The Centralized Hub provides for all hub functions to be performed by one organization, such as one of the Government of Canada departments or the territorial environmental boards, located in Yellowknife. This model provides the lowest potential for capacity building, but requires the least amount of time and resources. It would take approximately $300,000 - $325,000 and 1.5 years to develop and implement.

The Regional Hub provides for all hub functions to be performed by one organization, such as one of the co-management boards, located in Inuvik. This model provides a high potential for capacity building, but also requires the most time and resources. It would take approximately $500,000 - $525,000 and 2.5 years to develop and implement.

The Split Hub provides for the hub functions to be split between two organizations, one in Yellowknife, and one in Inuvik. The IMS Manager would be an employee of one of the Government of Canada departments or territorial environmental boards, while the IMS Technician would be an employee of one of the co-management boards. This model provides moderate potential for capacity building, but requires more time and resources than Option 1. It would take approximately $400,000 - $450,000 and 2.0 years to develop and implement.

Preferred Option

The preferred option – based on cost, time and technical capacity (i.e. infrastructure) – is Option 1 (Centralized Hub - Yellowknife).

However, a strong argument can be made for both Option 2 (Regional Hub – Inuvik) and Option 3 (Split Hub – Yellowknife/Inuvik) based on the goal of building community capacity.

Next Steps/Future Direction

This study will help guide the next stage in the development of an MVCIMP IMS. Specifically, this involves turning: 1) the survey results; 2) the analysis of the survey results; the description of the Options; and 4) the analysis of the Options into a Project Implementation Plan – which contains concrete goals, objectives, and details on how to turn the preferred option into reality.

1. INTRODUCTION

The Mackenzie Valley Cumulative Impact Monitoring Program (MVCIMP) is charged with monitoring the cumulative impact of land and water uses on the environment in the Mackenzie Valley. An information management system (IMS) will be developed for the MVCIMP which addresses the need for Cumulative Impact Monitoring (CIM) information to be coordinated at the Mackenzie-Valley wide level, while respecting regional systems, governments, and institutions established under existing or pending land claim and self government agreements.

The objective of this study is to identify and evaluate options, and recommend a strategy for developing an NWT cumulative impact information management system (IMS) which meets the following requirements:

- The system will include nodes (authoritative sources) and a single territorial hub to facilitate information flow between the nodes.

- Responsibility concerning access to and quality of information will rest with the nodes.

- The information to be managed will include:
  - monitoring activities and research projects;
  - geospatial data/systems;
  - publications, studies, and reports.

- The information to be managed will include both traditional and scientific knowledge.

- The system should encourage standardization of data access and presentation.

- The system should facilitate sharing of information beyond the NWT.

The MVCIMP Working Group identified a survey as the first step in designing and evaluating options for an effective MVCIMP IMS. This paper reports on the results of that survey, uses the issues raised in the survey to inform the discussion of the options for an MVCIMP IMS, and identifies a preferred option.

2. BACKGROUND

The MVCIMP is being coordinated by Indian and Northern Affairs Canada as laid out in the implementation plans for the Sahtu Dene and Metis Land Claim Agreement and the Gwich'in Comprehensive Land Claim Agreement, which call for a method of monitoring the cumulative impacts of land and water uses on the environment in the Mackenzie Valley. These requirements are also reflected in Part 6 of the *Mackenzie Valley Resource Management Act* (MVRMA). The MVCIMP uses the MVRMA's definition of environmental impact, which encompasses biophysical, social, and cultural impacts.

A Working Group of regional Aboriginal, territorial and federal government representatives, in consultation with community members, is guiding the development of the MVCIMP. Although the Inuvialuit Settlement Region (ISR) lies outside the Mackenzie Valley, it is represented on the Working Group. The ISR representative supports coordinating information management

initiatives in the Inuvialuit Settlement Region with the IMS for the Mackenzie Valley.

With a wealth of scientific and traditional knowledge on the impact of resource development in the Mackenzie Valley currently being produced, a process needs to be established to coordinate such information. An IMS is the logical solution. The IMS will support the regular independent environmental audits required under s. 148 of the MVRMA. The IMS developed for the MVCIMP will also be useful in meeting some of the information management needs identified by the NWT Cumulative Effects Assessment and Management (CEAM) Steering Committee.

The IMS will be supported by a communications program (separate from this project) which will ensure the communication of the information to communities and other interested parties in formats and methods appropriate to the audience.

In January of 2001, a workshop on Information Management for the MVCIMP was held in Yellowknife, NT. Out of that workshop, a Statement of Work (SOW) for this project was developed. The process of designing and evaluating options for an effective MVCIMP IMS began in earnest in the fall of 2001, with the surveys being developed by late November of that year.

3. METHODOLOGY

The SOW for this study set out 6 tasks to accomplish the process of identifying and evaluating options, and recommending a strategy for an MVCIMP IMS. These included:

- Identifying the potential nodes of a Cumulative Impact IMS;
- Developing an interview protocol for consulting representatives of the potential nodes;
- Interviewing representatives of the potential nodes;
- Reviewing Hub models suggested by the Working Group;
- Developing initial options for an MVCIMP IMS, and analyzing each option; and
- Identifying a preferred option.

The following sections outline the steps undertaken by the Project Team to accomplish these 6 tasks.

3.1 Identify the Potential Nodes of an MVCIMP IMS

The goal of this task was to identify potential nodes for an MVCIMP IMS based on existing environmental information sources and management activities in the NWT.

The Working Group used the list of participants surveyed at the January 23-25, 2001 CEAMF-MVCIMP Information Management Workshop in Yellowknife as a starting point for this task. The Working Group used that initial list to develop a more comprehensive list of potential respondents (i.e. nodes) that the survey could be administered to. This final list included all of the major stakeholders within the Mackenzie Valley that had an interest in CIM:

- The Government of Canada (Department of Indian Affairs and Northern Development; Department of Fisheries and Oceans; Environment Canada; Natural Resources Canada);
- The Government of the NWT (Resources Wildlife and Economic Development; Health and Social Services – Contaminants Unit);
- Aboriginal governments (including Akaitcho Treaty 8; the Deh Cho First Nations; Dogrib Treaty 11; the Gwich'in; the Inuvialuit; the North Slave Metis; the Sahtu; and the South Slave Metis);
- Co-management boards (in the Gwich'in, Inuvialuit, and Sahtu land claims regions);
- Territorial environmental permitting and review boards (Mackenzie Valley Land & Water Board; Mackenzie Valley Environmental Impact Review Board);

- Non-governmental environmental agencies (Canadian Parks and Wilderness Society; Canadian Nature Federation; Canadian Arctic Resources Committee; Ecology North; Global Forest Watch; World Wildlife Fund)

- The mining industry (NWT Chamber of Mines; BHP; Diavik);

- The oil and gas industry (Canadian Association of Petroleum Producers; Trans-Canada Pipelines); and

- Other important stakeholders (Aurora Research Institute; West Kitikmeot Slave Study).

Additionally, the respondent organizations were specifically asked (i.e., Survey Question # 33) whether they knew of other organizations which would be interested in an MVCIMP IMS and who should be sent the survey. This procedure resulted in an additional 6 surveys being received for consideration.

The full list of organizations (and specific divisions/units within those organizations) that were sent the survey is included as Appendix III.

3.2 Develop an Interview Protocol for Consulting the Potential Nodes

This goal of this task was to "identify the protocols, methods, and challenges of participating in a Cumulative Impact IMS".

The survey conducted for the January 23-25, 2001 CEAMF-MVCIMP Information Management Workshop served as the starting point for this task. The questions contained in that survey were used as the basis for the development of the Nodes Survey that was used for this study. The Nodes Survey – which was developed with input from the Working Group - consisted of 33 questions, which were divided into three sections:

- organization information (e.g. organization demographics; the amount of time spent on environmental monitoring activities; the importance of CIM to the organization; the importance of contributing to an MVCIMP IMS; Information Technology (IT), Geographic Information Systems (GIS), and Library personnel employed by the organization; and whether the organization was computer networked);

- CIM information use with the organization (e.g. the types of CIM information used/produced; information formats; the scope of CIM information; computer software program types; the amount of metadata associated with the organizations CIM information); and

- information sharing and costs (e.g. organizational access to the Internet; organization willingness to share CIM information; examples of information that could be shared or not shared; the major reasons for not sharing CIM information; organization capacity to share CIM information; resources needed to contribute to a CIM IMS, etc.).

A copy of the Nodes Survey is attached as Appendix I. The Nodes Survey was vetted by the MVCIMP Working Group, piloted (i.e. tested), and then revised before being administered to the potential nodes.

3.3 Interview Representatives of the Potential Nodes

The goal of this task was to – using the list developed in Step 1 and the protocol developed in Step 2 - interview representatives of the potential nodes.

The surveys were administered by fax and e-mail in late November 2001, with a suggested turnaround time for completion of approximately 3 weeks. Due to the nearness to the holiday season, however, some organizations requested additional time to respond. The surveying period was thus extended until mid-January, 2002.

By the end of the first week of January 2002, only 19 responses had been received by the Project Team. The Project Team followed-up with the potential nodes who had not yet responded (via e-mails, faxes and phone-calls) to try to improve the response rate. Additionally, Working Group members actively participated by reminding members within their organizations to respond to the survey. Seventeen (17) more responses were received as a direct result of the follow-up by the Project Team and the Working Group members.
The unit of analysis for the survey was the organization/department/section as a whole; respondents were advised to consult within their organizations before submitting completed surveys so as to improve the accuracy of the results.

3.4 Review Hub Approaches Suggested by the Working Group

The goal of this task was to review Hub approaches suggested by the Working Group, and note any required modifications for their applicability to the MVCIMP and the Cumulative Impact IMS. The suggested approaches for a model of a territorial Hub - which would facilitate the information flow between the nodes - included:

1) the Arctic Borderlands Ecological Knowledge Co-operative;

2) the Quebec Local Integrated Knowledge System (QLINKS); and

3) the Ecological Monitoring and Assessment Network (EMAN) North - Information Centre.

A second survey – to be administered to possible Hub examples - was designed by the Project Team. The Hub Survey consisted of the same 33 questions as the Nodes Survey, plus an additional 4 questions relating to website information costs and maintenance (e.g., budgetary and personnel costs for development; the length of time required to compile CIM information for the Website; whether any difficulties were encountered during the set-up of the Website; and, if so, a description of those difficulties). A copy of the Hubs Survey is attached as Appendix II.

In addition to the Arctic Borderlands Ecological Knowledge Co-operative and the EMAN-North organizations, the Hubs Survey was administered to:

- the Canadian Environmental Assessment Agency;
- Environment Canada's Canadian Information System for the Environment (CISE); and
- two other Websites currently under development which the Working Group thought might serve as useful models (the Fish & Wildlife Division of the Government of Alberta; Environment Canada – Alberta Region).

All attempts by the Project Team to contact the QLINKS site failed. The site has either moved or is defunct; and all links generated by web searches proved to be inactive. And although the EMAN-North organization were not able to return a completed survey within the suggested timeframe, a Project Team member later interviewed the Technical Co-ordinator of that site to obtain valuable input on the development of a Hub model. That interview data is included later in this report (see Section 4.1.4).

The full review of the EMAN North and Arctic Borderlands sites in regards to their applicability as possible hub models is outlined later in Section 5.

3.5 Develop Options for an MVCIMP IMS and Analyze Each Option

The goal of this task was to develop initial options for an MVCIMP IMS and analyze each option according to its:

- cost of development and implementation;
- time for implementation;
- potential to build community capacity;
- ability to provide information to users without internet access and meet the communications needs of communities;
- ability to provide territorial-level information; and
- roles, responsibilities, support structure and service expectations for the territorial hub.

Four (4) options for an MVCIMP IMS were developed, and each option was analysed according to the above-listed criteria. See Sections 5.2 through 5.5 (later in this report) for a full description of each option, as well as the required analysis.

3.6 Identify a Preferred Option

The goal of this task was to identify a preferred option for an MVCIMP IMS.

Of the four options developed and analysed, one was identified as the preferred option. See Section 5.6 (later in this report) for this identification.

4. THE MVCIMP SURVEY

This section of the report focuses on the MVCIMP IMS Survey, including:

- the survey results;
- the survey analysis; and
- the limitations of the study.

4.1 Survey Results

Sixty-six (66) surveys were sent out: 60 to potential nodes, and 6 to hub examples. Thirty-six (36) completed surveys were received back, for a response rate of 55% (and a confidence level of +/- 10%, 19 times out of 20). The response rate is very high for a mail-out type survey, and is likely due to the coordinated efforts of the Project Team and the Working Group.

A full listing of which organizations were sent the survey (and who responded) is included as Appendix III.

4.1.1 Organization Information

Responses were received from most of the major stakeholders interested in CIM within the Mackenzie Valley, including:

- the Government of Canada (Department of Indian Affairs and Northern Development; Department of Fisheries and Oceans; Environment Canada; Natural Resources Canada);
- the Government of the NWT (Resources Wildlife and Economic Development);
- aboriginal governments (including Dogrib Treaty 11; the Gwich'in; the Inuvialuit; the North Slave Metis; the Sahtu; and the South Slave Metis);
- environmental boards (including two territorial permitting boards, and the co-management boards in the Gwich'in, Inuvialuit, and Sahtu land claims regions);
- and other important stakeholders (including one provincial government; five non-governmental environmental agencies; one research institute; and two hub examples).

A full listing of which units/divisions within each organization who responded to the survey is included as Appendix III.

The major stakeholder not represented within the survey sample is that of industry. The Canadian Association of Petroleum Producers (CAPP) indicated that they, as an industry association, are not directly involved in collecting scientific/traditional knowledge information

(so thus did not fill out a survey). The persons contacted at both BHP Diamonds Inc., and Diavik Diamonds Inc. were not able to fill out the survey within the suggested timeframes. Calls and e-mails sent to the NWT Chamber of Mines were not returned (so the reason for their non-response is not clear).

Despite the lack of participation by the Industry sector, the breadth of coverage of the major stakeholders interested in CIM in the Mackenzie Valley is still quite extensive (i.e., all regions of the NWT, as well as the various levels of government).

Table 4.1.1.1 (next page) shows the types of organizations represented in the survey sample.

Table 4.1.1.1: Organization Type

Organization Type

		Frequency	Percent
Valid	Aboriginal Government	6	16.7
	Environmental Board	8	22.2
	Government - Canada	13	36.1
	Government - NWT	2	5.6
	Other	7	19.4
	Total	36	100.0

The “Government of Canada” (36%; N = 13) comprised the largest portion of the survey sample, while “Environmental Boards” (22%; N = 8), “Aboriginal Governments” (17%; N = 6), the GNWT (6%; N = 2) and “Other” organizations (19%; N = 7) made up smaller portions of the sample.

As Table 4.1.1.2 shows, the largest group of respondents (42%; N = 15) were located in Yellowknife, while the second largest group were from Inuvik (22%; N = 8).

Table 4.1.1.2: Location of Respondents

LOCATION

		Frequency	Percent
Valid	Edmonton	1	2.8
	Fort Good Hope	2	5.6
	Fort Resolution	1	2.8
	Fort Smith	2	5.6
	Hay River	1	2.8
	Inuvik	8	22.2
	Ottawa	2	5.6
	Rae-Edzo	1	2.8
	Tulita	1	2.8
	Whitehorse	1	2.8
	Winnipeg	1	2.8
	Yellowknife	15	41.7
	Total	36	100.0

While fewer surveys were received from other NWT communities (including Fort Good Hope, Fort Resolution, Fort Smith, Hay River, Rae-Edzo, and Tulita) and communities outside the NWT (including Whitehorse, Edmonton, Winnipeg and Ottawa), it can be argued that responses were received from a diversity of locations across the NWT.
Most of the organizations surveyed (45%; N = 16) devote less than 20% of their time to environmental monitoring activities, while less than a fifth of the organizations surveyed (17%; N = 6) devote more than 80% of their time to such activities (see Table 4.1.1.3: Appendix IV).

Despite the amount of time spent on environmental monitoring activities, the majority of respondents placed a high (67%; N = 24) or medium (33%; N = 12) importance on environmental monitoring to their organization (see Table 4.1.1.4: Appendix IV). Additionally, the majority of organizations placed a high (69%; N = 25) or medium (29%; N = 10) importance on contributing to/receiving information from a CIM IMS (see Table 4.1.1.5: Appendix IV).

Table 4.1.1.6 shows whether the respondent organizations employed Information Technology (IT), Geographical Information Systems (GIS), or Library personnel on either a full-time, part-time or out-source basis.

Table 4.1.1.6: Current IT/GIS/Library Staff

Organizations that Employ Staff	IT Staff %	IT Staff N	GIS Staff %	GIS Staff N	Library Staff %	Library Staff N
Full-Time	22	8	35	13	20	7
Part-Time	22	8	20	7	33	12
Outsource	36	13	28	10	11	4
None	20	7	17	6	36	13
TOTALS	100	36	100	36	100	36

Eighty percent (80%; N = 29) of organizations employ IT support personnel; eighty-three percent (83%; N = 30) of organizations employ GIS personnel; and sixty-four percent (64%; N = 23) of organizations employ Library personnel.

Table 4.1.1.7 shows the number (and percentage) of respondent organizations who have computer networks in place. Over 90% (92%; N = 33) of the organizations who responded were computer networked.

Table 4.1.1.7: Organizations That Are Computer Networked

Computer Networked

		Frequency	Percent
Valid	No	3	8.3
	Yes	33	91.7
	Total	36	100.0

4.1.2 CIM Information Use Within the Organization

Table 4.1.2.1 (Appendix IV) shows the types of CIM information that is used/produced by the organizations surveyed. “Fish and Wildlife” information, and “Land and Water Activity” information are used/produced by the most respondents (at 83%; N = 30 and 81%; N = 29, respectively).

Other types of CIM information – including “Land Use” information (64%; N = 23), “Remote Sensing” information (64%; N = 23), “Topographic” information (61%; N = 22), “Land Administration” information (50%; N = 18), “Geological” information (50%; N = 18), “ Socio-Economic” information (47%; N = 17), “Archeological/Heritage Resources” information (47%; N = 17), and “Cultural” information (47%; N = 17) - are used/produced by fewer organizations.

Table 4.1.2.2 shows the break-down of CIM information used/produced by the respondent organizations into the “Biophysical”, “Social” and “Cultural” categories. The majority of organizations use/produce mostly biophysical CIM information, and use/produce lesser amounts of social or cultural CIM information.

Table 4.1.2.2: Biophysical, Social and Cultural CIM Information

% of CIM Information	Biophysical		Social		Cultural	
	%	N				
80-100	53	19	---	---	---	---
60-80	22	8	---	---	---	---
40-60	3	1	3	1	3	1
20-40	8	3	11	4	11	4
0-20	6	2	39	14	39	14
No Answer	8	3	47	17	47	17
TOTALS	100	36	100	36	100	36

As Table 4.1.2.3 (Appendix IV) shows, "Regional Level" CIM information was used/produced by the largest number of respondents (39%; N = 14). CIM information that was "Territorial" in scope was used/produced by 28% of respondents (N = 10); "Local/Site Specific" CIM information was used/produced by 22% of respondents (N = 8); and "National/Trans-boundary" CIM information was used/produced by 11% of respondents.

Table 4.1.2.4 (next page) shows the format of the CIM information used/produced by the respondents.

Table 4.1.2.4: Format of CIM Information

Format of CIM Information

		Frequency	Percent
Valid	Half Electronic/Half Paper/Other	16	44.4
	Mostly Electronic	11	30.6
	Mostly Paper/Other	9	25.0
	Total	36	100.0

The most common format that CIM information was found in was "Half Electronic/Half Paper" (44% N = 16), while other formats – such as "Mostly Electronic" (31% N = 11) and "Mostly Paper/Other" (25%; N = 9) – were less common amongst the respondent organizations. The most common types of "Other" formats included video and audio tapes (mostly of cultural/traditional knowledge CIM).

Table 4.1.2.5 (in Appendix IV) shows the various computer applications used to house the electronic portions of the CIM information used/produced by the organizations. Database programs (69%; N = 25), GIS software (67%; N = 24), Word-processors (64%; N = 23), and Spreadsheets (64%; N = 23) were used the most to store CIM information.

Tables 4.1.2.6 and 4.1.2.7 show the GIS and Database applications used to store electronic CIM information within the organizations who responded.

Table 4.1.2.6: GIS Applications Used

Type of Application	Percent of Organizations	Number of Organizations
ArcView	70	25
ArcInfo	36	13
SPANS	14	5
MapInfo	8	3
Other	8	3

Table 4.1.2.7: Database Applications Used

Type of Application	Percent of Organizations	Number of Organizations
Access	47	17
SQL	14	5
Filemaker	11	4
Oracle	11	4
Other	17	6

The most commonly used GIS program was ArcView (70%; N = 25) and the most commonly used database was Access (47%: N = 17).

Table 4.1.2.8 shows that only a small percentage of the respondent organizations (17%; N = 6) have metadata associated with most of their CIM information. Approximately one-third of the respondents (N = 12) had metadata associated with less than 20% of their CIM information.

Table 4.1.2.8: CIM Data With Associated Metadata

% Data with Metadata

		Frequency	Percent
Valid	0-20	12	33.3
	20-40	4	11.1
	40-60	3	8.3
	60-80	2	5.6
	80-100	6	16.7
	Don't Know	9	25.0
	Total	36	100.0

As Table 4.1.2.9 (Appendix IV) shows, 61% (N = 21) of the organizations that had their CIM information in paper or other formats had some type of a library (or other document management system) in place. These systems ranged from formal library set-up's to simple paper filing schemes.

4.1.3 Information Sharing/Costs

Tables 4.1.3.1 and 4.1.3.2 (next page) show the number and percentages of organizations that had Internet access and their own Webpages (respectively). Ninety-seven percent (97%; N = 35) of the respondent organizations had Internet access, and 89% (N = 32) had their own websites.

Table 4.1.3.1: Internet Access

Internet Access

		Frequency	Percent
Valid	No	1	2.8
	Yes	35	97.2
	Total	36	100.0

Table 4.1.3.2: Own Website

Own Website

		Frequency	Percent
Valid	No	4	11.1
	Yes	32	88.9
	Total	36	100.0

As Table 4.1.3.3 (Appendix IV) shows, the most popular types of Internet access included "High-Speed/DSL/Cable" (44%; N = 16), "Dial-Up" (22%; N = 8), and "T1/T3" (14%; N = 5). Additionally, 36% (N = 13) of the respondents felt their Net access was fast; 58% (N = 21) felt their Net access was of medium speed; and 3% (N = 1) felt their Net access was slow (see Table 4.1.3.4, Appendix IV).

Table 4.1.3.5 shows the willingness of organizations to share CIM information.

Table 4.1.3.5: Willingness to Share CIM Information

Willingness to Share CIM Information

		Frequency	Percent
Valid	Very Willing	12	33.3
	Willing	23	63.9
	Not Willing	1	2.8
	Total	36	100.0

The majority of organizations were either "Willing" (64%; N =23) or "Very Willing" (33%; N = 12) to share their CIM information.

Examples of information that organizations were "Very Willing" to share include:

- public domain data;
- published data; and
- non-confidential information.

Examples of information that organizations were "Willing" to share include:

- data that is not yet published (with the written consent of the author);
- some data collected under data sharing agreements; and
- some unpublished data.

Examples of information that organizations were "Not Willing" to share include:

- data/reports that have not yet been peer reviewed;
- confidential information; and
- any information related to land claims or other sensitive negotiations.

As Table 4.1.3.6 (Appendix IV) shows, the major reasons for not sharing CIM information were: confidentiality concerns (39%; N = 14); quality control issues (19%; N = 7); proprietary data (14%; N = 5) and other concerns (6%; N = 2) – including cost recovery issues, and a lack of resources to share their organization's data.

Table 4.1.3.7 shows the extent to which organizations felt the majority of their CIM information was Internet ready. Fifty-eight percent (58%; N = 21) of respondents felt that the majority of their CIM information was not Internet ready.

Table 4.1.3.7 Majority of CIM Information Internet Ready

CIM Information Internet Ready

		Frequency	Percent
Valid	No	21	58.3
	Yes	15	41.7
	Total	36	100.0

Table 4.1.3.8 shows respondent organizations current capacity to share their CIM information via the Internet.

Table 4.1.3.8 Capacity to Share CIM Information

Capacity to Share

		Frequency	Percent
Valid	High	3	8.3
	Medium	18	50.0
	Low	15	41.7
	Total	36	100.0

Only 8% (N = 3) of organizations felt they currently had a high capacity to share their CIM information over the Internet – compared to 50% (N = 18) who felt they currently had a medium capacity to share their CIM information, and 42% (N = 15) who felt they currently had a low capacity to share their CIM information.

Table 4.1.3.9 (Appendix IV) shows that additional human resources was the first priority needed by organizations in order to get their CIM information ready for sharing; additional financial resources was the second priority; and additional technical resources was the third priority.

Table 4.1.3.10 (Appendix IV) shows where organization's CIM information was produced. The largest number of organizations produced the majority of their CIM information "In-house" (42%; N = 15), while the number of organizations that had the majority of their CIM information as "Mostly Links to Outside Sources" (25%; N = 9) and "Some In-house/Some Links" (28%; N = 10) comprised a lesser portion of the sample.

The major impediments to developing a CIM IMS listed by respondents included:

- high cost;
- compatibility problems between differing systems and data formats;
- capacity of the nodes to maintain CIM information;
- lack of metadata;
- transforming written reports into electronic format; and
- confidentiality issues/data sharing concerns.

4.1.4 Website Information/Costs

Two (2) survey responses were received from possible Hub examples (so the results presented here are not considered statistically valid). However, they do give an indication of some of the

issues faced in putting together and maintaining a central website. Additionally, the EMAN – North organization (though they were not able to formally respond to the survey within the suggested timeframe for completion) did provide valuable input as to how their model works through a personal interview between their Technical Co-ordinator and a Project Team member.

One of the respondents devoted approximately $75,000 to the development of their website ($50,000/year salary for one person for a year and a half), while another devoted approximately $60,000 (1 Full-time Person Year (PY) and 1 Part-time PY for approximately 6 months).

The length of time needed to compile the information for the websites ranged from "6 Months to a Year" to "A Year or 2" to "Over 2 Years" for the Hub models considered.

One of the three Hub models experienced difficulties when setting up their website. These difficulties included:

- lack of availability of data from other organizations; and
- problems with summarizing traditional knowledge into usable CIM formats.

4.2 Survey Analysis

The analysis of the survey data highlight a number of important issues which are important to the development of the options for an MVCIMP IMS. These issues can be grouped into two categories, and include:

- issues which guide the development of the options;
- challenges which must be addressed in order for an MVCIMP IMS to be successfully developed.

4.2.1 Issues Which Guide the Development of the Options for an MVCIMP IMS

The survey results highlight a number of issues which will guide the development of the options of an MVCIMP IMS, and include:

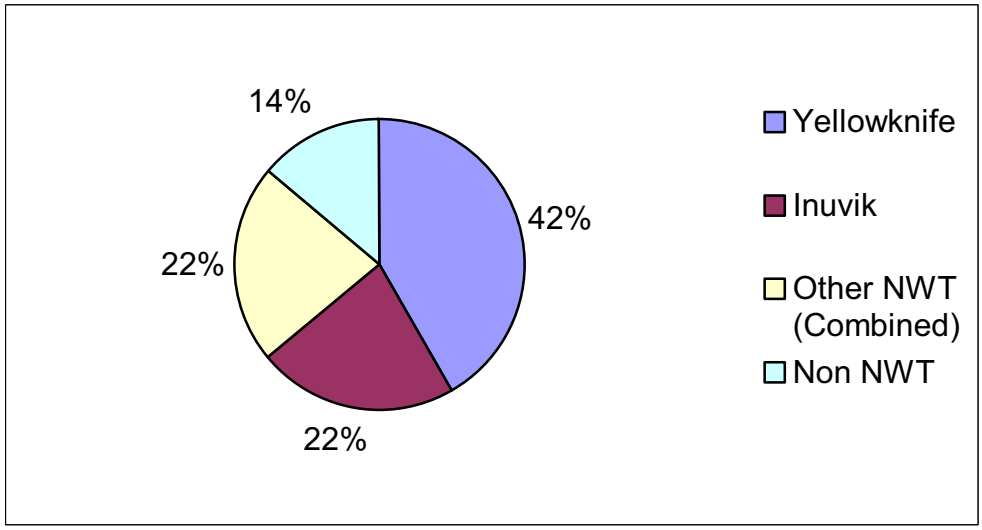
- possible locations for the territorial Hub;
- possible organizations which could host/house the territorial Hub;
- a high level of technical capacity of the potential nodes;
- standardization of programs; and
- the predominance of biophysical CIM.

4.2.1.1 Possible Locations for the Territorial Hub

The locations of the respondent organizations were outlined previously (in Section 4.1.1). What is important about these results is the strong representation of organizations located in Yellowknife and Inuvik.

Figure 4.2.1.1 (next page) shows the location of the respondent organizations.

Figure 4.2.1.1: Location of Respondent Organizations



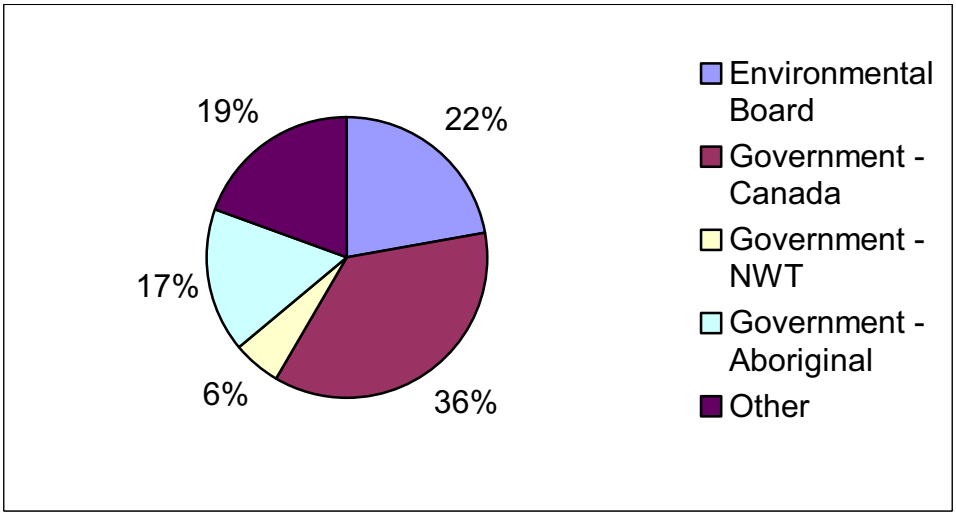
From this distribution - and given the level of activity regarding CIM interest in those two communities compared to other communities in the NWT and those outside the NWT - it would be safe to assume that the territorial Hub should be located in either Yellowknife or Inuvik.

4.2.1.2 Possible Organizations Which Could Host the Territorial Hub

The types of organizations who responded were outlined previously (in Section 4.1.1). What is important about these results is the strong representation of the Government of Canada (especially by DIAND, DFO, and Environment Canada) and the environmental boards (including the MVEIRB, MVLWB and the co-management boards).

Figure 4.2.1.1 shows the types of organizations who responded.

Figure 4.2.1.2: Types of Organization



From this distribution – and given the level of activity regarding CIM interest in those organizations compared to other types of organizations - it would be safe to assume that the territorial Hub should be housed/hosted by either the Government of Canada (possibly by DIAND, DF O, or Environment Canada) or one of the environmental boards (e.g., the MVEIRB, MVLWB, or one of the co-management boards).

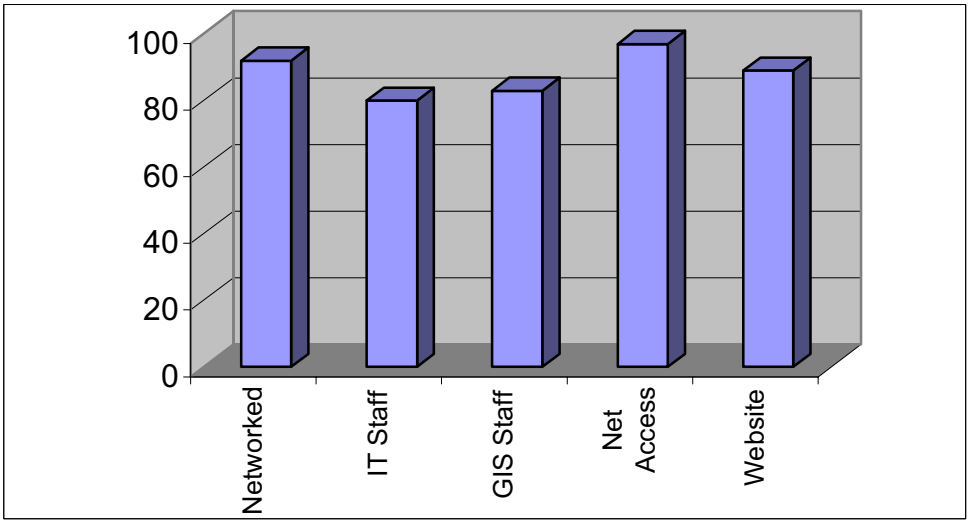
4.2.1.3 High Level of Technical Capacity of the Potential Nodes

The level of technical capacity of the respondent organizations can be seen in the results of the questions regarding:

- the number of organizations that are computer networked (see Section 4.1.1);
- the number of IT and GIS personnel employed by the organizations (see Section 4.1.1);
- the number of organizations that are connected to the Internet (see Section 4.1.3); and
- the number of organizations that have their own Websites (see section 4.1.3).

Figure 4.2.1.3 shows this level of technical capacity.

Figure 4.2.1.3: Level of Technical Capacity of the Potential Nodes



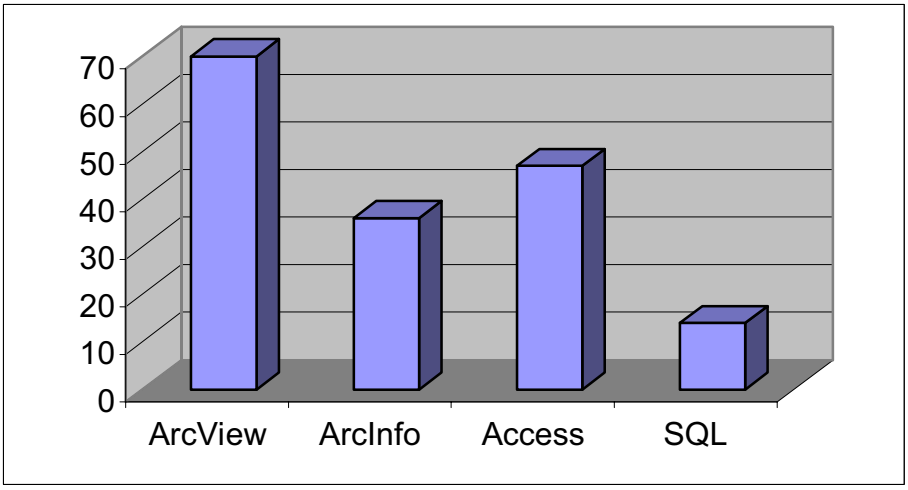
What is important about these results is the high level of technical capacity of the potential nodes. This should make the technical portions of the IMS easier to implement.

4.2.1.4 Standardization of Programs

The types of programs used by potential nodes were outlined previously (in Section 4.2.1). What is important about these results is the emergence of potential GIS and database standards.

Figure 4.2.1.4 (next page) shows the most commonly used GIS and database programs.

Figure 4.2.1.4: Standardization of Programs



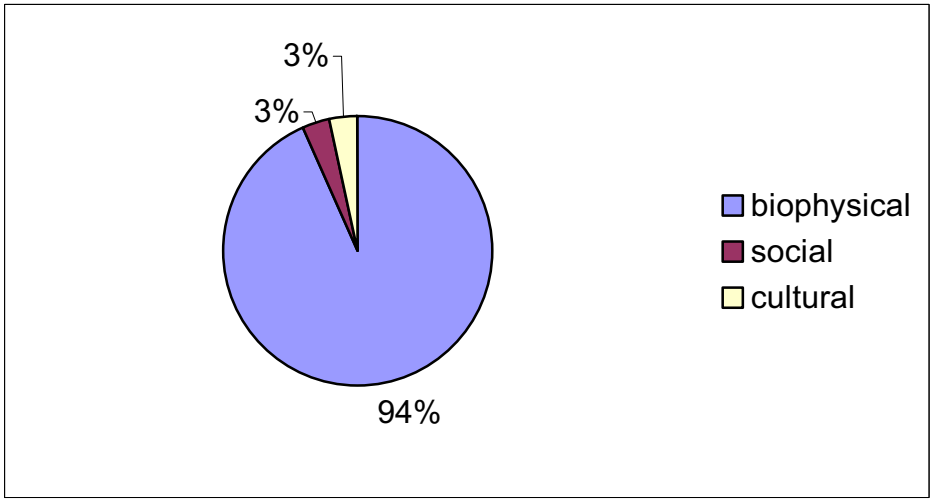
ArcView (ESRI) was the most commonly used GIS program and could serve as the potential standard for GIS software (especially when compared to the next most commonly used program – ArcInfo). Microsoft Access was the most commonly used database program and could serve as the potential standard for database software (especially when compared to the next most commonly used program – SQL).

4.2.1.5 Predominance of Biophysical CIM Information

The amount of CIM information (divided into the biophysical, social and cultural categories) was outlined previously (in Section 4.2.1). What is important about these results is the predominance of biophysical CIM information.

Figure 4.2.1.5 shows the comparison between biophysical, social and cultural CIM information currently used/produced by the potential nodes (where 40% or more of the organization's CIM information is of that category).

Figure 4.2.1.5: Biophysical, Social, and Cultural CIM Information



The predominance of biophysical monitoring information in the nodes is not surprising given the past and current focus of environmental assessment. The inclusion and consideration of both social and cultural impacts in monitoring and assessment is legally mandated and the collection and organization of this type of CIM information should increase in the near-term.

4.2.2 Challenges Which Must be Addressed

The survey results highlight a number of issues which must be addressed before an MVCIMP IMS can successfully be developed, and include:

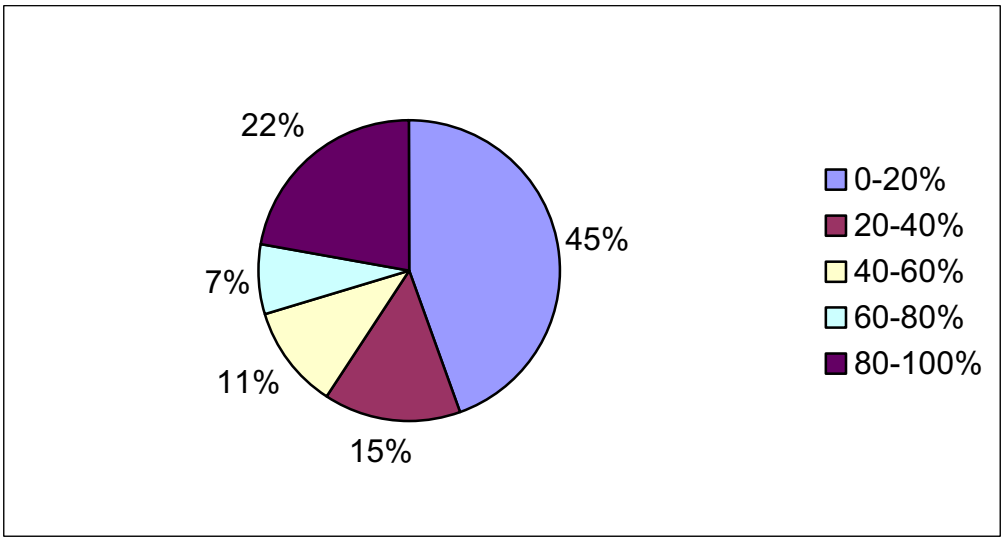
- the lack of metadata associated with CIM information;
- the low capacity of the potential nodes to share their CIM information;
- most of the CIM information at the nodes is not currently Internet ready;
- the need for additional resources at the node level; and
- systemic/structural issues (such as data sharing concerns).

4.2.2.1 Lack of Metadata

The amount of metadata associated with the current CIM information existing within the potential nodes was outlined previously (in Section 4.2.1). What is important about these results is the lack of metadata.

Figure 4.2.2.1 shows the approximate level of metadata at the node level.

Figure 4.2.2.1: Amount of Metadata



By far the most striking result of the survey is the lack of existing metadata. Just over a fifth (22%) of the potential nodes have metadata associated with most of their CIM data. Since the structure of the IMS (predetermined in the Scope of Work) specifies that information be maintained by the authoritative sources, and that the Hub act as a distribution facilitator, this presupposes that the system will be built on metadata. That is to say, the IMS itself will not so much involve the exchange of information, but the exchange of metadata regarding who has what data, and information about that data.

Compilation of metadata does not require sophisticated technology. It requires a standard format and a trained person who knows how to compile metadata correctly. In accordance with the predetermined hub/node model, each authoritative source should have responsibility for compilation of metadata for their own data. The most immediate priority should be to ensure that each node has a person who has the training and time to compile the required metadata. This work should not be done by external consultants, as there has to be a long-term, sustainable process to maintaining metadata “from the inside”.

The hub/node model is based on the premise that each node will be capable of maintaining their own data and metadata, and the technological infrastructure and human resources required to support the IMS. Since there are widely differing capacities at the moment (refer to survey results), the MVCIMP will have to support the development of some of the nodes in order for the system to function. The IMS will only be as good as the nodes that it is based on. It doesn’t matter how good the hub is, if there is no data or metadata to distribute.

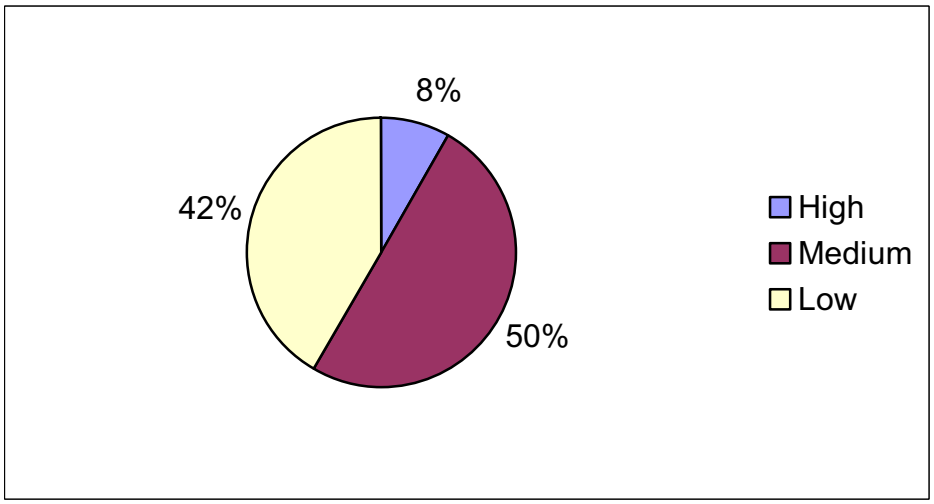
Standards for metadata need to be implemented as part of the IMS. For GIS data, the suggested standard should be the ESRI ArcGIS metadata standard, which is based on the U.S. Federal Geographic Data Committee (FGDC: www.fgdc.gov/) standard. Since the vast majority of Microsoft Access data will have some spatial reference anyway, it is suggested that metadata for database files also follow the same standard. Hardcopy documents, and audio and videotapes should follow the U.S. Library of Congress standard. Adopting these standards will ensure that organizations within the NWT and worldwide will be able to rapidly assess and evaluate IMS data and compare it with data from other sources and geographic regions.

4.2.2.2 Low Capacity of the Potential Nodes to Share Their CIM information

The capacity of the potential nodes to share their CIM information was outlined previously (in Section 4.3.1). What is important about these results is the current low capacity of the potential nodes to share such information.

Figure 4.2.2.2 (next page) shows the capacity of the nodes to share their CIM information via the Internet.

Figure 4.2.2.2: Capacity of Potential Nodes to Share CIM Information



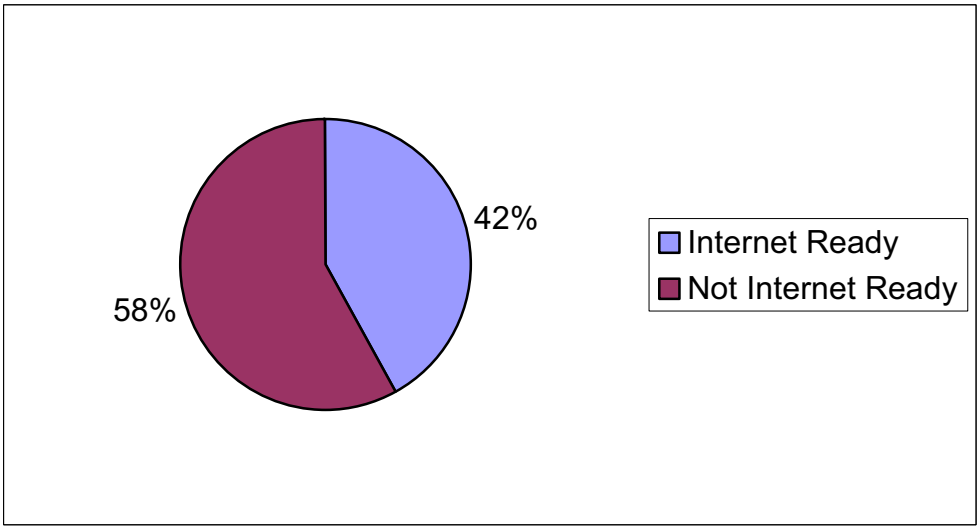
The high percentage of potential nodes who have a “Low” capacity to currently share their CIM information must be addressed if the MVCIMP IMS is to succeed.

4.2.2.3 CIM Information at the Node Level is Not Internet Ready

The amount of CIM information at the node level that is currently Internet ready was outlined previously (in Section 4.3.1). What is important about these results is the current high percentage of potential nodes that felt that the majority of their CIM information was not Internet ready.

Figure 4.2.2.3 shows the Internet readiness of the majority of the potential nodes CIM information.

Figure 4.2.2.3: Internet Readiness of Majority of Potential Nodes CIM Information



The high percentage of potential nodes that felt that the majority of their CIM information was not Internet ready will need to be addressed if the MVCIMP IMS is to succeed.

4.2.2.4 The Need for Additional Resources at the Node Level

The survey data indicated that the amount of resources that would be put into an IMS is critical to the success of the project.

As noted previously in Section 4.1.1, the majority of organizations placed a medium or high importance on contributing to/receiving information from a CIM IMS. Additionally, a large part of the CIM information which would contribute to an MCIMP IMS is produced "In-house" by the organizations themselves.

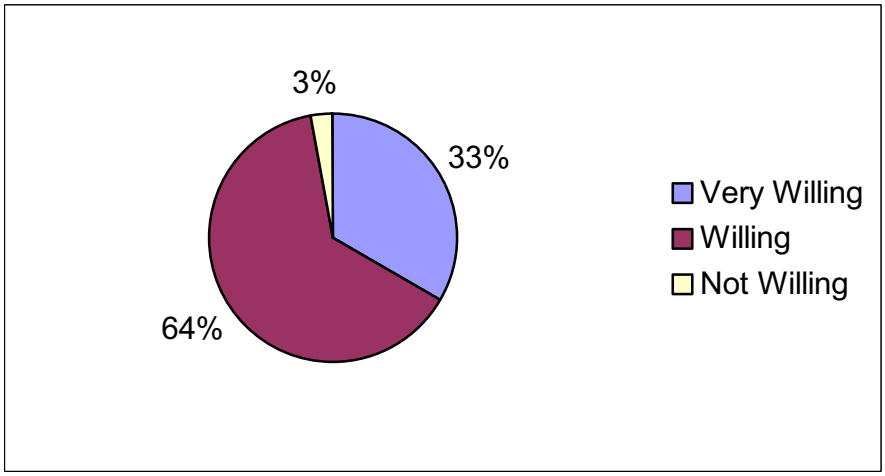
However, all of the organizations surveyed noted that additional resources (especially human and financial resources) would be needed in order for those organizations to properly produce CIM information that could be effectively used for the MVCIMP IMS.

4.2.2.5 Systemic/Structural Issues

A few systemic and structural issues must also be considered critical to the successful development of an MVCIMP IMS.

The survey data indicated a high willingness on the part of the organizations to share CIM information (which is represented in Figure 4.2.2.5).

Figure 4.2.2.5: Willingness to Share CIM Information



However, systemic/structural issues such as confidentiality, quality control, and the proprietary nature of some of the data (see the results for Question # 26, Section 4.3.1) raise legitimate concerns about the ability of the prospective partners to act on that willingness to co-operate.

4.3 Limitations

There are two limitations to this study which must be noted, and which include:

- the scope/length of survey; and
- the lack of industry participation.

4.3.1 Scope/Length of Survey

The scope and length of the survey limited the amount of data that could be collected and the analysis that was possible. Although both the Nodes Survey (33 Questions) and the Hubs Survey (37 Questions) provide for a fairly extensive level of detail and analysis, they are in no means a substitute for the level of detailed information that will be required to implement the MVCIMP IMS. That higher level of detail will only be obtained through on-site visits to the potential nodes.

4.3.2 Lack of Industry Participation

Although every attempt was made to include representatives of the mining, and oil and gas industries in this study, the fact that they were unable to participate limits the report's findings. The participation of those industry segment would have strengthened this report

5. REVIEW OF HUB APPROACHES SUGGESTED BY THE WORKING GROUP

As directed by the SOW (#4), the Project Team reviewed possible hub model sites suggested by the Working Group. Three such sites were suggested for review:

- the Arctic Borderlands Ecological Knowledge Co-operative;
- the Ecological Monitoring and Assessment Network (EMAN) North – Information Centre; and
- the Quebec Local Integrated Knowledge System (QLINKS). (http://qlinks.ucs.mun.ca/html/eqlinks.htm)

The first two sites provided a great deal of valuable information to the Project Team in regards to designing a hub model. However, all attempts by the Project Team to contact the QLINKS site failed – so it was not possible to review it for applicability to this project. That site has either moved or is defunct; and all links generated by web searches proved to be inactive.

5.1 The Arctic Borderlands Ecological Knowledge Co-operative

The Arctic Borderlands Ecological Knowledge Co-operative (http://www.taiga.net/coop/index1.html) is run by the Arctic Borderlands Ecological Knowledge Society, a non-profit organization incorporated in the Yukon. It has a flat organizational structure, with decisions being reached by consensus at annual gatherings. A board of directors is elected at each annual gathering. Environment Canada (Yukon) serves as co-ordinator. The Co-op's role is to develop and share information about ecosystems for decision-makers to use. Funding is from various sources (currently government and co-management boards and councils), and is acquired on a yearly basis.

The site is a well laid-out, summary level source of ecological monitoring information, written for the general public. It's strengths are that it:

- provides summaries and trends of ecological monitoring information; and
- that it is written at a level that makes it accessible to a wide range of people (researchers; bureaucrats and the general public).

It's weaknesses – in relation to this project (and it's applicability as a possible hub model) – are that:

- it is not a Hub-Node system (i.e. there are no links back to the nodes who provided the CIM information);
- it is not a meta-data system; and

- the raw data that is contained on the site is not in a readily-usable format for other researchers (i.e. it has been translated into summary format and plotted onto graphs, but there are no links to a complete database or spreadsheet).

Due to the weaknesses just outlined, the Arctic Borderlands Ecological Knowledge Co-operative - as is - would not serve as a possible hub model for an MVCIMP IMS.

5.2 The EMAN North – Information Centre

The northern Ecological Assessment and Monitoring Network (EMAN-North) is a network for the coordination of ecological monitoring in northern Canada. Environment Canada is working in the three northern territories and northern Manitoba in close partnership with many agencies and programs to develop this network. The EMAN-North steering committee includes representatives of seven federal government agencies, three territorial government agencies, two northern research institutes, and university researchers. Environment Canada staff (based in Yellowknife and Whitehorse) chair the committee and act as coordinators.

The following principles, acknowledged by all partners, are integral to the successful operation of the EMAN-North network. EMAN-North is:

- based on voluntary cooperation by partners;
- a collaboration of parties working in relative independence but sharing a common vision;
- operated with limited centralized control, direction, and financial resources;
- built, in large part, on existing programs; few new programs have resulted from the program; and
- focused on standardizing approaches and sharing information.

The EMAN-North Information Centre (http://www.emannorth.ca/ic/) site is a well laid-out, in-depth source of ecological monitoring information, written for researchers and the general public. It's strengths are that it:

- is an excellent example of a Hub-Node model;
- is a metadata based system;
- has links back to the Nodes and the raw data; and
- provides status and trends summaries of CIM information (i.e. translates technical, scientific information into plain language).

The only weaknesses in relation to this project (and it's applicability as a possible hub model) – are that:

- the metadata formats should be standardized (see Section 4.2.2.1); and

- the raw data provided by the links should be in a more readily-usable format for other researchers (i.e. it has been translated into summary format and plotted onto graphs for certain days, but there are no links to the complete database or spreadsheet).

The EMAN-North Information Centre could serve as a possible hub model for an MVCIMP IMS, as long as the two weaknesses outlined above were addressed.

6. MVCIMP IMS OPTIONS

6.1 Introduction

This section of the report identifies and analyzes the options available for an MVCIMP IMS. Three options are outlined, including:

- a Centralized Hub;
- a Regional Hub; and
- a Split Hub.

The analysis of each option along the criteria contained in the SOW (and outlined previously in Section 3.5) is included in Section 6.5; identification of a preferred option is included in Section 6.6.

Additionally, it must be strongly emphasized that all of the options identified and analyzed on the following pages must address the challenges raised by the survey results (Section 4.2) in order for the IMS to succeed. Specifically, this includes overcoming:

- the lack of metadata associated with CIM information;
- the current low capacity of the potential nodes to share their CIM information;
- most of the CIM information at the nodes is not currently Internet ready;
- the need for additional resources at the node level; and
- systemic/structural issues (such as data sharing concerns).

Failure to address these issues will doom the IMS to failure.

6.1.1 IMS Structure

The Working Group specified that this study was to concentrate solely on IMS options based on a decentralized, "virtual" structure. The primary function of the IMS would be to share monitoring metadata, which would include information about how to obtain actual data from authoritative sources, but not to distribute that data directly. In the hub/node model specified by the Working Group, the hub would gather and maintain monitoring metadata provided by nodes, which are authoritative (primary) sources of monitoring data. The hub would then provide end-users with access to the compiled metadata.

6.1.2 Definitions

Node
Nodes are defined in the Scope of Work as authoritative sources of monitoring data. The main roles of each node within the IMS will be to:

- provide metadata to the system so that IMS users can identify monitoring data sources and evaluate whether they are suitable for a particular purpose

- accommodate requests for actual monitoring data by delivering monitoring data to end-users where deemed appropriate

Hub
The hub will be a group or organization charged with the responsibility of compiling metadata on a continual basis and designing and maintaining a means of providing access to that metadata for a wide variety of end-users. The hub will suggest standards for data and metadata to the nodes, although conformance with any suggested standards will be at the discretion of each node. The hub will not be responsible for negotiating data sharing agreements, since that responsibility must rest with each node, who will be in the best position to decide how and when data should be shared.

End User
An end user of the IMS will be anyone interested in obtaining information about monitoring data and/or how to access that data. The delivery of information within the IMS will attempt to accommodate varying levels of capacity (e.g. lack of internet access) but a certain level of technical sufficiency (i.e. relating to monitoring and technology) must be assumed. Adapting the IMS beyond that assumed level will be part of the Communication component of the IMS, which is being developed as a separate project.

Capacity

Node Capacity
Each node must have the capacity to compile its own metadata related to its own monitoring data collection, and be able to transmit that metadata to the hub. Generally speaking, there should be a direct relationship between level of monitoring activity and existing IMS capacity. Low levels of monitoring activity (e.g. annual harvest study) will require low capacity. High levels of monitoring activity (e.g. Environment Canada) will require high capacity. In both cases the required capacity is likely already the same as existing capacity. The only time additional capacity will be required is where there is a gap between existing monitoring capacity and required IMS capacity.

Hub Capacity
The hub must be able to compile metadata on a continual basis, and have the ability to design and maintain a means of providing access to that metadata. The hub must also be able to identify new potential nodes and liaise with these groups as needed.

6.1.3 Technical Options

Implementation

The four functions of the hub are to:

- liaise with each node, and suggest standards for data and metadata formats;
- collect metadata from each node on an ongoing basis and enter that metadata into a relational database;
- provide public access to the metadatabase through a web interface; and
- provide web-hosting of the IMS website

Implementation will require:

- hiring one IMS Manager;
- initiating contact with each node to establish relationship for liaison;
- establish data and metadata standards;
- hiring one IMS Technician, who will either complete or contract out:
  - database design, including links to web interface;
  - website and interface design;
  - setup of web hosting service.

The database and website design could be either completed in house (over a period of approximately 6 months) or contracted out at a cost of between $50,000 - $75,000.

The hub will be responsible for creation of a metadatabase using commercial, off-the-shelf relational database, such as Microsoft Access. The database structure will be closely based on existing metadata standards. A web-based front end, or user interface, will be designed and linked to the metadatabase. The database and web interface will be hosted on a web server. Each node will be asked to conduct an inventory of all monitoring data, and to fill out online metadata input forms. Any nodes without internet access will be asked to fill out the submission form on removable media, such as a Zip disk or rewritable CD-ROM.

Maintenance

Ongoing maintenance will require:

- Staff support (financial and infrastructure, e.g. office space, computer, etc.);
- an IMS Manager;
- an IMS Technician; and

- a Web server with adequate bandwidth

The Hub will maintain one database that contains metadata that conforms to a known metadata standard, such as the FGDC standard. This metadatabase will be maintained in a commercial, off-the-shelf relational database, such as Microsoft Access. A web-based front end, or user interface, will be maintained and updated periodically. This database will have an online, password protected data entry form, where an appointed person from each node can access, enter, and update their own metadata. This would then be submitted to the hub, which would then perform QA/QC on the submission before approving its entry into the IMS metadatabase.

6.1.4 Organizational Options

All three of the following options are based on different structural configurations of the Hub. The configuration of the nodes is the same in all three options, since their role and responsibilities will be the same regardless. The options address the four hub functions, which can either be performed by one group or organization (centralized hub; regional hub), or by two organizations in different geographic locations (split hub). The differences in the three models reflect different levels of emphasis on capacity-building, cost, and the timelines estimated for development and implementation..

6.2 Option 1: Centralized Hub

6.2.1 Description

All four hub functions are performed by one organization, such as one of the Government of Canada departments or the territorial environmental boards (see Section 4.2.1.2), located in Yellowknife (see Section 4.2.1.1). This model provides the lowest potential for capacity building, but requires the least amount of time and resources. The two positions are created and filled during implementation. The database and web site design could be either completed in house (over a period of approximately 6 months) or contracted out at a cost of between $50,000 - $75,000. Web hosting could be provided in house or contracted out at a minimal cost.

6.2.2 Cost of Development and Implementation

IMS Manager:	$70,000/year
IMS Technician:	$55,000/year
Office support:	$40,000/year

Costs are based on best estimates of the Project Team members, as well as with comparisons of costs associated with the development of other Hub models considered by the survey (see Section 4.1.4).

Note: this cost does not include the costs associated with database and website design (which could be either completed in house over a period of approximately 6 months) or contracted out (at a cost of between $50,000 - $75,000.) The 6-months or $50,000-$75,000 would have to be added to the cost depending on the route taken.

6.2.3 Time for Implementation

Staff hiring and start-up:	6 months
Database and web design:	6 months (concurrent)
Initial compilation of metadata:	1 year .
Total time:	1.5 years

Time for implementation is based on best estimates of the Project Team members, as well as with comparisons of timelines associated with the development of other Hub models considered by the survey (see Section 4.1.4).

6.2.4 Potential to Build Capacity

This option has a low potential to build community capacity, since it is based on the strategy of leveraging as much existing capacity as possible within the existing organizations. It is also assumed that the capacity to fill the two required positions probably currently exists within the Yellowknife IT community (so no new capacity would be needed).

6.2.5 Information Access

The Scope of Work stated the requirement to address the "ability to provide information to users without internet access and meet the communications needs of communities". The IMS will be an internet-based system. A static version of the IMS metadatabase will be published on suitable removable media, such as a Zip disk or CD-ROM on a quarterly basis. A hardcopy version will not be produced.

6.2.6 Ability to Provide Territorial-level Information

As with all options presented, this ability will be limited by the metadata provided by the nodes.

6.2.7 Roles, Responsibilities, Support Structure and Service Expectations

As mentioned above. It should be noted that the hub is a separate entity from the Working Group and the Responsible Authority, and that the hub's responsibilities are limited to performing the four functions stated earlier.

6.3 Option 2: Regional Hub

6.3.1 Description

All four hub functions are performed by one organization, such as one of the co-management boards (see Section 4.2.1.2), located in Inuvik (see Section 4.2.1.1). This model provides a high potential for capacity building, but also requires the most time and resources. The two positions are created and filled during implementation. The database and web site design could be either completed in house (over a period of approximately 6 months) or contracted out at a cost of

between $50,000 - $75,000. Web hosting could be provided in house or contracted out at a minimal cost.

6.3.2 Cost of Development and Implementation

IMS Manager:	$75,000/year
IMS Technician:	$60,000/year
Office support:	$50,000/year

It is assumed the costs for staff and office support are slightly higher in Inuvik than for Yellowknife. Costs are based on the research and best estimates of the Project Team members, as well as with comparisons of costs associated with the development of other Hub models considered by the survey (see Section 4.1.4).

Note: this cost does not include the costs associated with database and website design (which could be either completed in house over a period of approximately 6 months) or contracted out (at a cost of between $50,000 - $75,000.) The 6-months or $50,000-$75,000 would have to be added to the cost depending on the route taken.

6.3.3 Time for Implementation

Staff hiring and start-up:	1year
IMS Technician training:	6 months
Database and web design:	6 months (concurrent)
Initial compilation of metadata:	1 year
Total time:	2.5 years

Time for implementation is based on best estimates of the Project Team members, as well as with comparisons of timelines associated with the development of other Hub models considered by the survey (see Section 4.1.4). It is assumed that the time for implementation is slightly longer for Inuvik than Yellowknife based on a longer start-up time (i.e. an additional 6 months) and the addition of the IMS Technician training (6 months).

6.3.4 Potential to Build Capacity

This option has a high potential to build community capacity. It is assumed that the capacity to fill the two required positions probably does not currently exist within the Inuvik IT community (so new capacity would have to built). Additionally, there would likely be more efficiency than Option 3, since one office would be set up to house both positions. However, there may be political ramifications if one group is seen to be favored over another.

6.3.5 Information Access

The Scope of Work stated the requirement to address the "ability to provide information to users without internet access and meet the communications needs of communities". The IMS will be an internet-based system. A static version of the IMS metadatabase will be published on suitable removable media, such as a Zip disk or CD-ROM on a quarterly basis. A hardcopy version will not be produced.

6.3.6 Ability to Provide Territorial-level Information

As with all options presented, this ability will be limited by the metadata provided by the nodes.

6.3.7 Roles, Responsibilities, Support Structure and Service Expectations

As mentioned above. It should be noted that the hub is a separate entity from the Working Group and the Responsible Authority, and that the Hub's responsibilities are limited to performing the four functions stated earlier.

6.4 Option 3: Split Hub

6.4.1 Description

The four hub functions are split between two organizations, one in Yellowknife (see Section 4.2.1.1), and one in Inuvik (see Section 4.2.1.1) The IMS Manager would be an employee of one of the Government of Canada departments or territorial environmental boards (see section 4.2.1.2), while the IMS Technician would be an employee of one of the co-management boards (see section 4.2.1.2). This model provides moderate potential for capacity building, but requires more time and resources than Option 1.

The two positions are created and filled during implementation. The database and web site design could be either completed in house (over a period of approximately 6 months) or contracted out at a cost of between $50,000 - $75,000. Web hosting could be provided in house or contracted out at a minimal cost.

6.4.2 Cost of Development and Implementation

IMS Manager:	$70,000/year
IMS Technician:	$60,000/year
Office support:	$40,000-$50,000/year (depending on location)

It is assumed the costs for staff and office support are slightly higher in Inuvik than for Yellowknife. Costs are based on the research and best estimates of the Project Team members, as well as with comparisons of costs associated with the development of other Hub models considered by the survey (see Section 4.1.4).

Note: this cost does not include the costs associated with database and website design (which could be either completed in house over a period of approximately 6 months) or contracted out (at a cost of between $50,000 - $75,000.) The 6-months or $50,000-$75,000 would have to be added to the cost depending on the route taken.

6.4.3 Time for Implementation

Staff hiring and start-up:	6 months – 1 year
IMS Technician training:	6 months (concurrent)
Database and web design:	6 months - 1 year (concurrent)

Initial compilation of metadata:	1 year
Total time:	2.0 years

Time for implementation is based on best estimates of the Project Team members, as well as with comparisons of timelines associated with the development of other Hub models considered by the survey (see Section 4.1.4).). It is assumed that the time for implementation is slightly longer for this Option (compared to Option #1) based on either a longer start-up time (i.e. up to 6 months) or the addition of the IMS Technician training (6 months).

6.4.4 Potential to Build Capacity

This option has a moderate potential to build community capacity, since it requires training and skills development for the IMS Technician position (located in Inuvik). It is assumed that the capacity to fill the required position probably does not currently exist within the Inuvik IT community (so new capacity would have to built). Additionally, one potential advantage is the required cooperation between regional groups at the hub level, which would enhance awareness and buy-in in the region and perhaps in other regions.

6.4.5 Information Access

The Scope of Work stated the requirement to address the "ability to provide information to users without internet access and meet the communications needs of communities". The IMS will be an internet-based system. A static version of the IMS metadatabase will be published on suitable removable media, such as a Zip disk or CD-ROM on a quarterly basis. A hardcopy version will not be produced.

6.4.6 Ability to Provide Territorial-level Information

As with all options presented, this ability will be limited by the metadata provided by the nodes.

6.4.7 Roles, Responsibilities, Support Structure and Service Expectations

As mentioned above. It should be noted that the hub is a separate entity from the Working Group and the Responsible Authority, and that the hub's responsibilities are limited to performing the four functions stated earlier.

6.5 Analysis of the Three Options

The SOW outlined that the analysis of the options was to be conducted along the following 6 criteria:

- cost of development and implementation
- time for implementation;
- potential to build community capacity;

- ability to provide information to users without Internet access and meet the communications needs of communities;

- ability to provide territorial-level information; and

- roles, responsibilities, support structure and service expectations for the territorial hub.

All three options were identical in their provision of the last three criteria (so additional extensive analysis is not provided here). The options did differ along the first three criteria (and those differences are reported next).

6.5.1 Cost of Development and Implementation

Option 1 (Centralized Hub) is the least expensive of the three options – with total development and implementation costs of between $300,000 - $325,000.

Option 2 (Regional Hub) is the most expensive of the three options - with total development and implementation costs of between $500,000 - $525,000.

Option 3 (Split Hub) is in between Option 1 and Option 2 in terms of cost - with total development and implementation costs of between $400,000 - $450,000.

All total cost estimates were obtained by adding the salaries of the 2 positions and office support, multiplying that by the total time expected, then adding in the database and website design costs (i.e., all total cost estimates assume the contracting out of development).

6.5.2 Time For Implementation

Option 1 (Centralized Hub) would take the least amount of time to implement (approximately 1.5 years).

Option 2 (Regional Hub) would take the longest amount of time to implement (approximately 2.5 years).

Option 3 (Split Hub) would take longer than Option 1 but less time than Option 2 1 (approximately 2.0 years).

6.5.3 Potential to Build Community Capacity

Option 2 provides for the highest amount of community capacity building.

Option 1 provides for the lowest amount of community capacity building.

Option 3 provides for more community capacity building than Option 1, but less than Option 2.

6.5.4 Summary

Table 6.5.4 shows a summary of the analysis of the three options along the cost/time/capacity building criteria.

Table 6.5.4: Summary of Options

Option	Cost	Time	Capacity Building
Option 1: Centralized Hub	$300,000 - $325,000	1.5 Years	Low
Option 2: Regional Hub	$500,000 - $525,000	2.5 Years	High
Option 3: Split Hub	$400,000 - $450,000	2.0 Years	Medium

6.6 The Preferred Option

The preferred option – based on cost, time and technical capacity (i.e. infrastructure) – is Option 1 (Centralized Hub - Yellowknife).

However, a strong argument can be made for both Option 2 (Regional Hub – Inuvik) and Option 3 (Split Hub – Yellowknife/Inuvik) based on the goal of building community capacity.

7. FUTURE WORK/NEXT STEPS

This study will help guide the next stage in the development of an MVCIMP IMS. Specifically, this involves turning:

- the survey results (outlined in Section 4.1);
- the analysis of the survey results (outlined in section 4.2);
- the description of the Options (outlined in Sections 6.2 through 6.4); and
- the analysis of the Options (outlined in Section 6.5)

into a Project Implementation Plan.

The Project Implementation Plan would develop the challenges (raised in Section 4.2) and the description of the options (raised in Sections 6.2 - 6.4) into more concrete objectives/specifics. For example, one of the challenges raised was that additional resources were required at the node level so as to allow the nodes to participate more effectively in an MVCIMP IMS. A more detailed analysis – through onsite visits and interviews – would allow for clarification of just what human/technical/financial resources are required, and how they would be implemented. This would also validate the needs of nodes, and provide justification so that project resources are used wisely.

Additionally, the current description of the options provides for hosting/housing the territorial Hub in one of the Government of Canada departments (especially by DIAND, DFO, and Environment Canada) or the environmental boards (including the MVEIRB, MVLWB and the co-management boards). A more detailed analysis – through onsite visits and interviews – would allow for clarification of just who should be the host of the territorial Hub.

Both the clarification of what types of additional resources are required and who would host the territorial Hub would be addressed within the Project Implementation Plan.

8. CONCLUSION AND RECCOMENDATION

This survey of the major stakeholders of CIM information in the Mackenzie Valley has highlighted a number of positive circumstances which could contribute to the successful development of an MVCIMP IMS:

- a strong belief in the importance of the project;
- the emergence of possible locations for the territorial Hub (e.g. Yellowknife and/or Inuvik);

- the emergence of possible host organizations locations for the territorial Hub such as the Government of Canada (especially DIAND, DFO and Environment Canada) and the environmental boards (the MVEIRB, MVLWB and the co-management boards);

- the high technical capacity of the potential nodes to participate in the project;

- a high willingness on the part of the potential nodes to share CIM information; and

- the emergence of possible standards for GIS (ArcView) and database (Access) software.

However, the survey has also indicated that a number of important issues must be addressed before an MVCIMP IMS could successfully be developed:

- the current lack of metadata associated with the majority of CIM information;

- the low capacity of the potential nodes to share their CIM information;

- most of the CIM information at the nodes is not currently Internet ready;

- the need for additional resources (specifically human and financial) at the node level; and

- some systemic/structural issues regarding data sharing need to be overcome.

It is recommended that Option 1 (a Centralized Hub – located in Yellowknife) be adopted as the preferred model for the development of an MVCIMP IMS. The details of how that option would be turned into reality would be determined in the next stage of this project (the Project Implementation Plan).

APPENDIX I: THE NODES SURVEY

Section I: Organization Information

1. Organization Name: _____

2. Organization Location: _____
(i.e. head office or mailing location)

3. Your Title/Position _____
within the Organization

4. What percent of time does your organization devote to activities related to environmental monitoring?

___ 0 - 20% ___ 20% - 40% ___ 40% - 60%
___ 60% - 80% ___ 80% - 100%

5. How would you rate the importance of environmental monitoring to your organization?

___High ___ Medium ___ Low

6. How would you rate the importance of contributing to/receiving environmental monitoring information from an IMS?

___High ___ Medium ___ Low

7. What IT/GIS/library staff and/or resources does your organization currently have in place? (please indicate the number of full-time or part time staff for each component, or whether you outsource).

IT	**GIS**	**Library**
___ Full-time	___ Full-time	___ Full-time
___ Part-time	___ Part-time	___ Part-time
___ Outsource	___ Outsource	___ Outsource

8. Is your organization currently computer networked?

___Yes ___ No

Section II: Cumulative Impact Monitoring (CIM) Information Use Within Your Organization

9. The following are types of information that can be used for Cumulative Impact Monitoring (CIM). What kind(s) of CIM information does your organization use/ produce? (**please check all that apply**)

___ Fish and Wildlife
___ Land and Water Activity
___ Socio-Economic
___ Archeological/Heritage Resource
___ Remote Sensing (satellite imagery &/or air photos)
___ Other (**please specify**): _____
_____
_____
___ Land Use
___ Topographic
___ Land administration
___ Geological
___ Cultural

10. What percentage of your CIM information is:

___ Biophysical ___ Social ___ Cultural

11. How would you classify the scope of the majority of your information?

___ Local/Site Specific
___ Territorial
___ Regional
___ National/Trans-boundary

12. What format(s) is this CIM information available in?

___ Mostly Electronic
___ Half Electronic/ Half Paper/Other
___ Mostly Paper/Other

13. If you have CIM information in formats other than electronic or paper, please describe what they are:

_____
_____
_____
_____

14. If you have CIM information in electronic format, what applications are they stored in? **Please check all that apply**. (If your CIM information is **NOT** in electronic format, **Skip to 18.)**

___ Word processor applications (Microsoft Word; WordPerfect, etc)
___ GIS
___ Other (**please specify**):
_____
_____

___ Databases (Access, Oracle, etc)
___ Spreadsheets (Excel, Lotus, etc)
___ Acrobat (PDF)

15. If your organization uses GIS software to manage CIM information, what programs are they? **Please check all that apply**. (If your organization does **NOT** use GIS software, **Skip to 16.)**

___ MapInfo
___ SPANS
___ Other (**please specify**):
_____
_____

___ ArcView
___ ArcInfo

16. What percentage of your CIM data has associated metadata (i.e. documentation on the data for the benefit of other users)?

___ 0 - 20%
___ 20% - 40%
___ 40% - 60%
___ 60% - 80%
___ 80% - 100%
___ Don't Know

17. If your organization uses Database software to manage CIM information, what programs are they? **Please check all that apply**. (If your organization does **NOT** use Database software, **Skip to 18.)**

___ Filemaker
___ Oracle
___ Other(**please specify**):
_____
_____

___ Access
___ SQL

18. If your CIM information is in paper or other formats, does your organization have a library system (whether formal or informal) or other document management system in place? (If your CIM information is in electronic format, **Skip to 20.)**

___ Yes
___ No

19. If Yes, please describe:

_____
_____
_____
_____

Section III: Information Sharing/Costs

20. Does your organization have access to the Internet?

___Yes ___ No

21. If Yes, what type of access is it?

___ Dial Up
___ T1/T3
___ Don't Know
___ HIGH SPEED/DSL/Cable
___ Other (please specify):
_____
_____

22. How would you describe this access?

___Fast ___ Medium ___ Slow

23. Does your organization have its own Website?

___Yes ___ No

24. How willing is your organization to freely share CIM information (i.e. Very Willing = freely share information in all cases; Willing = share information but may require sharing agreements or compensation; Not Willing = not share under any circumstances).

___ Very Willing ___ Willing ___ Not Willing

25. If your organization would share some CIM information very willingly, and other CIM information only under certain conditions, and further CIM information not at all, please give examples of each:

Very Willing: _____
Willing: _____
Not Willing: _____

26. If your organization is not willing to share its CIM information, why not?
Please check all that apply. (If your organization is willing to share information, **Skip to 27**).

___ Quality Control
___ Proprietary Data
___ Confidentiality
___ Other (**please specify**):
_____
_____

27. Is the majority of your CIM information Internet ready? (i.e. you could fairly easily make it accessible over the Internet if you wanted to)

___Yes ___ No

28. If your organization were to share CIM information via the Internet, what is the current capacity of your organization to make such information ready for sharing? (i.e. High = you could do it within your existing human/technical/financial resources; Medium = you could do it with the addition of some human/technical/financial resources; Low = you could do it only with the addition of substantial human/technical/financial resources).

___High ___ Medium ___ Low

29. If you need additional human/technical/financial resources to make your CIM information ready for sharing, please specify the importance of your needs: (**rank each** as 1st, 2nd or 3rd; **rank only** those that your organization would currently require)

___ Human (Addition of staff, training, etc.)
___ Technical (hardware, software, networks, Net access, etc.)
___ Financial (more funding for IT, etc).

30. Is the CIM information you use/produce…
(**please check only one**)

___ Mostly Produced In-house
___ Produced In-House with Links to Outside Sources
___ Mostly Links to Outside Sources

31. What impediments do you foresee in developing an IMS?

_____
_____
_____
_____
_____
_____
_____

32. Do you have any additional comments regarding the development of an IMS for the MVCIMP?

_____
_____
_____
_____
_____
_____
_____
_____

33. Are there any other organizations that you know of that should be sent this survey? If so, please list the organization and the contact name and number that the survey would be sent to.

	Organization	**Contact Person**	**Phone**
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____

Thank you for your time and your input! You will receive a copy of the Final Report of the Survey Results once it is completed.

APPENDIX II: THE HUBS SURVEY

Section I: Organization Information

1. Organization Name: _____

2. Organization Location: _____
(i.e. head office or mailing location)

3. Your Title/Position _____
within the Organization

4. What percent of time does your organization devote to activities related to environmental monitoring?

___ 0 - 20% ___ 20% - 40% ___ 40% - 60%
___ 60% - 80% ___ 80% - 100%

5. How would you rate the importance of environmental monitoring to your organization?

___High ___ Medium ___ Low

6. How would you rate the importance of contributing to/receiving environmental monitoring information from an IMS?

___High ___ Medium ___ Low

7. What IT/GIS/library staff and/or resources does your organization currently have in place? (please indicate the number of full-time or part time staff for each component, or whether you outsource).

IT	**GIS**	**Library**
___ Full-time	___ Full-time	___ Full-time
___ Part-time	___ Part-time	___ Part-time
___ Outsource	___ Outsource	___ Outsource

8. Is your organization currently computer networked?

___Yes ___ No

Section II: Cumulative Impact Monitoring (CIM) Information Use Within Your Organization

9. The following are types of information that can be used for Cumulative Impact Monitoring (CIM). What kind(s) of CIM information does your organization maintain?
(please check all that apply)

___ Fish and Wildlife
___ Land and Water Activity
___ Socio-Economic
___ Archeological/Heritage Resource
___ Remote Sensing (satellite imagery &/or air photos)
___ Other (**please specify**): _____
_____
_____
___ Land Use
___ Topographic
___ Land administration
___ Geological
___ Cultural

10. What percentage of your CIM information is:

___ Biophysical ___ Social ___ Cultural

11. How would you classify the scope of the majority of your information?

___ Local/Site Specific
___ Territorial
___ Regional
___ National/Trans-boundary

12. What format(s) is this CIM information available in?

___ Mostly Electronic
___ Half Electronic/ Half Paper/Other
___ Mostly Paper/Other

13. If you have CIM information in formats other than electronic or paper, please describe what they are:

_____
_____
_____
_____

14. If you have CIM information in electronic format, what applications are they stored in? **Please check all that apply**. (If your CIM information is **NOT** in electronic format, **Skip to 18.)**

___ Word processor applications (Microsoft Word; WordPerfect, etc)
___ GIS
___ Other (**please specify**):
_____
_____

___ Databases (Access, Oracle, etc)
___ Spreadsheets (Excel, Lotus, etc)
___ Acrobat (PDF)

15. If your organization uses GIS software to manage CIM information, what programs are they? **Please check all that apply**. (If your organization does **NOT** use GIS software, **Skip to 16.)**

___ MapInfo
___ SPANS
___ Other (**please specify**):
_____
_____

___ ArcView
___ ArcInfo

16. What percentage of your CIM data has associated metadata (i.e. documentation on the data for the benefit of other users)?

___ 0 - 20%
___ 20% - 40%
___ 40% - 60%
___ 60% - 80%
___ 80% - 100%
___ Don't Know

17. If your organization uses Database software to manage CIM information, what programs are they? **Please check all that apply**. (If your organization does **NOT** use Database software, **Skip to 18.)**

___ Filemaker
___ Oracle
___ Other(**please specify**):
_____
_____

___ Access
___ SQL

18. If your CIM information is in paper or other formats, does your organization have a library system (whether formal or informal) or other document management system in place? (If your CIM information is in electronic format, **Skip to 20.)**

___ Yes
___ No

19. If Yes, please describe:

_____
_____
_____
_____

Section III: Information Sharing

20. Does your organization have access to the Internet?

___Yes ___ No

21. If Yes, what type of access is it?

___ Dial Up
___ T1/T3
___ Don't Know
___ HIGH SPEED/DSL/Cable
___ Other (please specify):
_____
_____

22. How would you describe this access?

___Fast ___ Medium ___ Slow

23 Does your organization host its own Website?

___Yes ___ No

24. How willing is your organization to freely share CIM information (i.e. Very Willing = freely share information in all cases; Willing = share information but may require sharing agreements or compensation; Not Willing = not share under any circumstances)

___ Very Willing ___ Willing ___ Not Willing

25. If your organization would share some CIM information very willingly, and other CIM information only under certain conditions, and further CIM information not at all, please give examples of each:

Very Willing: _____
Willing: _____
Not Willing: _____

26. If your organization is not willing to share its CIM information, why not?
(**please check all that apply**)

___ Quality Control
___ Proprietary Data
___ Confidentiality
___ Other (**please specify**):
_____

27. Is the majority of your CIM information Internet ready? (i.e. you could fairly easily make it accessible over the Internet if you wanted to)

___Yes ___ No

28. If your organization were to share CIM information via the Internet, what is the current capacity of your organization to maintain such information? (i.e. High = you could do it within your existing human/technical/financial resources; Medium = you could do it with the addition of some human/technical/financial resources; Low = you could do it only with the addition of substantial human/technical/financial resources).

___High ___ Medium ___ Low

29. If you need additional human/technical/financial resources to maintain CIM information, please specify the importance of your needs: (**rank each** as 1st, 2nd or 3rd ; **rank only** those that your organization would currently require)

___ Human (Addition of staff, training, etc.)	___ Technical (hardware, software, networks, Net access, etc.)	___ Financial (more funding for IT, etc).

Section IV: Website Information Costs/Maintenance

30. What is the cost of maintaining the CIM information you currently share on your Website? (in approximate actual dollars or full-time person equivalents?)

_____
_____
_____
_____
_____

31. How long did it take you to compile this CIM information and start your Website?

___ Less than 6 Months ___ 6 Months to a Year
___ a Year or 2 ___ Over 2 years

32. Did you encounter any difficulties in gathering/organizing/presenting the CIM information you currently have on your Website?

___Yes ___ No **(if No, Skip to 34)**

33. If Yes, please describe these difficulties?

_____
_____
_____
_____
_____

34. Is the CIM information presented on your website…
(**please check only one**)

___ Mostly Produced In-house ___ Produced In-House with Links to Outside Sources ___ Mostly Links to Outside Sources

35. What impediments do you foresee in developing an IMS?

_____
_____
_____
_____
_____
_____

36. Do you have any additional comments regarding the development of an IMS for the MVCIMP?

_____
_____
_____
_____
_____
_____
_____

37. Are there any other organizations that you know of that should be sent this survey? If so, please list the organization and the contact name and number that the survey would be sent to.

	Organization	**Contact Person**	**Phone**
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____

Thank you for your time and your input! You will receive a copy of the Final Report of the Survey Results once it is completed.

APPENDIX III: POTENTIAL/PARTICIPATING ORGANIZATIONS

Note: All organizations listed were sent the survey, but only those highlighted in bold responded. Some units/divisions within organizations sent in combined responses

A) ENVIRONMENTAL MONITORING/REVIEW/PERMITING BOARDS:

Gwich'in Settlement Area
- **Gwich'in Land & Water Board**
- **Gwich'in Land Administration**
- **Gwich'in Renewable Resources Board**

Inuvialuit Settlement Region
- **Joint Secretariat – Inuvialuit Renewable Resources Committees**
- **Environmental Impact Screening Committee**
- **Inuvialuit Game Council**
- **Fisheries Joint Management Committee**
- **Environmental Impact Review Board**
- **Wildlife Management Advisory Council (North Slope)**
- **Wildlife Management Advisory Council (NWT)**

Sahtu Settlement Region
- **Sahtu Land and Water Board**
- **Sahtu Land Use Planning Board**
- **Sahtu Renewable Resources Board**

Territorial
- **Mackenzie Valley Environmental Impact Review Board**
- **Mackenzie Valley Land & Water Board**

B) GOVERNMENT - CANADA

DIAND
- **Contaminants Division**
- **Geological Mapping**
- **Land Administration**
- **Renewable Resources & Environment**

Taiga Environmental Laboratory
- **Environment & Conservation**
- **Information Management (IMAG)**
- **Water Resources**

DFO
Freshwater Institute Library
Fisheries Management
Environmental Science

Environment Canada
Environmental Conservation
Environmental Protection
Meteorological Services
Mackenzie River Basin Board

Natural Resources Canada
Geological Survey of Canada

C) GOVERNMENT- OTHER

Aboriginal:

Aikaitcho Treaty 8
Fort Resolution Environmental Working Committee

Deh Cho Region
Deh Cho First Nations
Fort Providence Resource Management Board

Dogrib Region
Dogrib Treaty 11

Gwich'in Settlement Area
Gwich'in Tribal Council

Inuvialuit Settlement Region
Inuvialuit Regional Corporation

North Slave
North Slave Metis Alliance

Sahtu Settlement Region
Deline Land Corp.
K'asho Got'ine District Land Corp.
Sahtu Secretariat Incorporated
Tulita District Land Corp.

South Slave
South Slave Metis Tribal Council

GNWT:

Health and Social Services
Contaminants Unit

Resources, Wildlife and Economic Development
Forrest Management Division
NWT Centre for Remote Sensing
Wildlife & Fisheries Division
Inuvik Regional Office

D) INDUSTRY

Petroleum Industry
Canadian Association of Petroleum Producers - Head Office (Calgary)
TransCanada Pipelines

Mining Industry
NWT Chamber of Mines
BHP
Diavik

E) OTHER

Non-Governmental Environmental Agencies
Canadian Nature Federation
Canadian Parks and Wilderness Society
CARC
Ecology North
Global Forest Watch
World Wildlife Fund Canada
West Kitikmeot Slave Study

Research Institutes
Aurora Research Institute

F) HUBS

Arctic Borderlands Ecological Knowledge Co-operative
Canadian Environmental Assessment Agency
Canadian Information System for the Environment (CISE)
Environmental Monitoring and Assessment Network (EMAN) North
Environment Canada (Alberta)
Government of Alberta – Department of Sustainable Development (Fish & Wildlife Division)

APPENDIX IV: ADDITIONAL SURVEY RESULTS TABLES

Table 4.1.1.3: Time Spent on Environmental Monitoring

Time Spent on Environmental Monitoring

		Frequency	Percent
Valid	0-20	16	44.4
	20-40	6	16.7
	40-60	5	13.9
	60-80	3	8.3
	80-100	6	16.7
	Total	36	100.0

Table 4.1.1.4: Importance of Environmental Monitoring

Importance of Environmental Monitoring

		Frequency	Percent
Valid	High	24	66.7
	Medium	12	33.3
	Total	36	100.0

Table 4.1.1.5: Importance of Contributing to CIM IMS

Importance of a CIM IMS

		Frequency	Percent
Valid	High	25	69.4
	Medium	10	27.8
	Low	1	2.8
	Total	36	100.0

Table 4.1.2.1: Types of CIM Information Used/Produced

Type	Percent	Number
Fish & Wildlife	83	30
Land & Water Activity	81	29
Land Use	64	23
Remote Sensing	64	23
Topographic	61	22
Land Administration	50	18
Geological	50	18
Socio-Economic	47	17
Archeological/Heritage Resources	47	17
Cultural	47	17

Table 4.1.2.3: Scope of CIM Information

Scope of CIM Information

		Frequency	Percent
Valid	Local/Site Specific	8	22.2
	National/Trans-boundary	4	11.1
	Regional	14	38.9
	Territorial	10	27.8
	Total	36	100.0

Table 4.1.2.5: Applications Used to Store CIM Information

Type of Application	Percent of Organizations	Number of Organizations
Database	69	25
GIS	67	24
Word processor	64	23
Spreadsheet	64	23
PDF (Adobe Acrobat)	36	13
Other	14	5

Table 4.1.2.9: Library System for Non-Electronic CIM Information

Library System

		Frequency	Percent
Valid	N/A	8	22.2
	No	6	16.7
	Yes	22	61.1
	Total	36	100.0

Table 4.1.3.3: Type of Internet Access

Type of Internet Access

		Frequency	Percent
Valid	Dial Up	8	22.2
	Don't Know	4	11.1
	High Speed/DSL/Cable	16	44.4
	Other	3	8.3
	T1/T3	5	13.9
	Total	36	100.0

Table 4.1.3.4: Speed of Internet Access

Access Speed

		Frequency	Percent
Valid	Fast	13	36.1
	Medium	22	61.1
	Slow	1	2.8
	Total	36	100.0

Table 4.1.3.6: Reasons for Not Sharing CIM Information

Reason	Percent of Organizations	Number of Organizations
Quality Control	19	7
Proprietary Data	14	5
Confidentiality	39	14
Other	6	2

Table 4.1.3.9: Resources Needed to Share CIM Information

Resources Needed	Human		Technical		Financial	
	%	N				
1st Priority	59	21	8	3	39	14
2nd Priority	19	7	11	4	39	14
3rd Priority	3	1	53	19	11	4
Not a Priority	19	7	28	10	11	4
TOTALS	100	36	100	36	100	36

Table 4.1.3.10: Production of CIM Information

CIM Info Produced

		Frequency	Percent
Valid	Mostly In-house	15	41.7
	Mostly links to outside	9	25.0
	No Answer	2	5.6
	Produced In-house, links to outside	10	27.8
	Total	36	100.0