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**A Feasibility Study
for a
Bibliographic Reference Network:
EA Reference Net**

Executive Summary

A Feasibility Study for an **EA Bibliographic Reference Network - EA Reference Net**

This study assesses the feasibility of establishing an **EA Reference Net** under the auspices of an *EA Strategic Alliance* between FEARO and Canadian universities involved with environmental assessment research and teaching. The net would facilitate the exchange of environmental assessment information and research results. The goal is to improve environmental decision making by making environmental assessment (**EA**) information more readily available for environmental assessment and to improve environmental assessment research and teaching.

The scope of EA continues to be broadened as concern for the integrity of the environment and sustainable development increases. More attention is being paid to cumulative effects on the environment. Further, the spatial scope and temporal scope of EA has been dramatically increased. This means that faster access to more information resources of better quality is required to support EA and to improve environmental decision making.

There are a number of EA reference files in various academic settings and in FEARO, the contents of which need to be more widely and readily available. In addition to meeting the need to identify, document and share EA information holdings within the EA community, the proposed **EA Reference Net** has the potential to be a catalyst for a strong *EA Strategic Alliance*.

A number of university departments involved with **EA** and environmental studies have indicated interest in the *EA Strategic Alliance* concept. At the Dalhousie University School for Resource and Environmental Studies (SRES) an important bibliographic reference file, established with FEARO assistance, is already in place. This database could provide the critical mass and model for an **EA Reference Net** database or databases.

This report identifies a number of functional capabilities which might be incorporated into the **EA Reference Net** depending on the desires of the *EA Strategic Alliance* members and their willingness to participate and commit resources. A set of five technical system options for **EA Reference Net** are presented with analysis of the advantages and disadvantages of each and the estimated costs - both one-time and ongoing.

A number of issues which must be resolved are also identified. These issues "are to be dealt with at workshop on the *EA Strategic Alliance* concept. If, as a result of the workshop, there is sufficient interest and commitment, a project will be initiated, under a formal project plan, to implement the selected technical system option(s). The project would be reviewed annually. A major review would be undertaken at the end of three years.

A Feasibility Study for an EA Bibliographic Reference Network - EA Reference Net

1.0 Purpose of the EA Bibliographic Reference Network Initiative

The purpose of the project under study is to develop an *EA Strategic Alliance* of FEARO and the Canadian universities involved with environmental assessment research and teaching, for the exchange of environmental assessment (**EA**) information and research results. The goal is to improve environmental decision making by making EA information more readily available for environmental assessment and to improve environmental assessment research and teaching. The following objectives have been set to meet this goal:

- to improve access to bibliographic resources concerning environmental information;
- to achieve more effective research and development through improved cooperative efforts and information sharing between FEARO and the university community, and among the universities; and,
- to enhance the education and training of persons involved in EA.

2.0 Purpose of the Study

This study was initiated to explore the feasibility of using computer-based means of information transfer and exchange among practitioners in Environmental Assessment, with focus on the academic community and FEARO. The purpose is to:

- to assist FEARO in its evaluation of the costs and benefits of such a network; and,
- to provide a feasibility analysis of options for discussion at a workshop convened by FEARO to assess the need for, and interest in such a network on the part of the *EA Strategic Alliance*.

3.0 Background

There is a requirement for FEARO to foster an *EA Strategic Alliance* with Canadian universities which are involved in EA research and teaching and there is a need to facilitate cooperative endeavors and information exchange among the EA community.

The scope of EA has been, and will continue to be broadened, as concern for the integrity of the environment and for sustainable development increases. More attention is to be paid to long-term cumulative effects of actions affecting the environment. Further, the spatial scope and temporal scope of any given EA will be increased dramatically. This requires that more factors must be taken into account. This, in turn, means that faster access to more

information resources of better quality, will be required to support the **EA** process. Access to the required information must **be** improved so as to improve decision making with respect to environmental concerns and sustainable development.

In many cases valuable information is already available and well-organized for use in EA but there are, as yet, no practical or effective means for identifying the existence of the information, assessing its potential value to EA practitioners and researchers, or gaining access to the information. This situation certainly exists in the academic community which has many repositories of important environmental information which for all practical purposes, are not accessible for use by those outside the holding organization.

There is a will on the part of the universities to improve this situation but the individual programs cannot afford the expense in time, labour and dollars to make their holdings more readily available. This project would directly address this situation by facilitating the exchange, as a start, of bibliographic reference information.

The first stage of the initiative under study will focus on the possible development of a network for computer-based EA bibliographic and reference information. This network, called **EA Reference Net** would at the outset, link a core group of not more than five universities and FEARO. Each of the universities in the core group has a vigorous graduate-level program in Environmental Studies and have considerable information resources of value to EA practitioners.

4.0 Rationale

There are a number of EA reference files in various academic settings and in FEARO, the contents of which need to be more widely and readily available. In addition to meeting the need to identify, document and share EA information holdings within the EA community, the proposed **EA Reference Net** has the potential to be a catalyst for the *EA Strategic Alliance*.

The **EA Reference Net** concept is entirely consistent with the rapidly growing trend toward increased use of networking, sharing and cooperating through use of computers and telecommunications. Further, the services and technologies to implement **EA Reference Net** are readily available at nominal, marginal costs.

The project under study is one of several complementary initiatives within **FEARO**. Some are now in progress and others are being considered. There are other initiatives outside of **FEARO** which could support, or be supported by, the **EA Reference Net**. Some examples are:

- **FEARO's** Information Resources Management (FIRM) Task Force;
- **FEARO's** Executive Information Support (**EIS**) initiative;
- **FEARO's** Environmental Impact Assessment Directory;
- National Roundtable on the Environment and Economics initiatives;
- **GreenNet** and other Green Plan initiatives; and,
- **DFO's** **ICOIN** Directory Services Centre project.

5.0 Review of the Current Situation

A number of university departments involved with EA and environmental studies have indicated interest in the *EA Strategic Alliance* concept. At the Dalhousie University School for Resource and Environmental Studies (SRES) an important bibliographic reference file, established with **FEARO** assistance, is already in place. This database could provide the critical mass for **EA Reference Net**.

A number of other information holdings on EA at other universities are available for incorporation into **EA Reference Net**. In addition, **FEARO** has holdings of interest.

6.0 Review of SRES' EA Reference System On-line Bibliographic catalog

This database located at Dalhousie University's School of Resource and Environmental Studies (SRES), is a select bibliography containing approximately 3,000 citations with emphasis on the grey literature and important articles on EA from the professional journals. The database also contains citations to conference proceedings, bibliographies and hard-bound literature.

The SRES database runs on an MS-DOS PC under Notebook and allows all the normally-used search routines for a flat-file database. The database content is kept current by periodic review of the literature by graduate students to capture interesting citations in addition to the citations which come to the group's awareness in the normal course of work. The current 3,000 citations have an average of 500 text characters per record and represent approximately 1.25 million bytes (characters) of text in ASCII form. This equates to approximately 1,000 pages of printed text. The database includes a shelf location code for each citation.

The **SRES** EA Reference database would lend itself to being published to other institutions **or** incorporated into a multi-user database for on-line access by remote users. The data structures are straight forward and are completely adequate for browsing and query searches. This database is an excellent candidate to serve as a model for use by the *EA Alliance*.

7.0 Definition of Organizational and Logistics Issues

EA Reference Net would likely be an initiative sponsored by FEARO and operated with the active participation of, at most, five or six of the university members of the *EA Strategic Alliance*. To properly establish the network in whatever form it takes, certain support and commitments must be forthcoming from FEARO and the participants.

These commitments and support are as follows:

- sponsorship -
guiding and co-funding by each participant with start-up funding by FEARO;
- governance -
exercised through the *EA Strategic Alliance* as a project sponsored by the *EA Strategic Alliance*;
- **administration** -
necessarily simple, lean and direct at the level of individual nodes with coordination by FEARO;
- **database development and maintenance** -
if required, might be provided by one of the participants or by an outside contractor; and,
- technical support -
if required, would probably be provided by an outside contractor since it is unlikely that one of the members would choose to establish the necessary staff and system.

The levels of commitment and support in the above areas will be dictated by the resources available to the parties, the interest of the parties and the system option(s) chosen to implement the **EA Reference Net**. Resolution of these and other important issues will be the task of *EA Strategic Alliance* Workshop being convened by FEARO.

Whatever kinds and levels of commitment are made to the **EA Reference Net** initiative, the project would undergo an annual review by the *EA Strategic Alliance* to determine whether the project is meeting its objectives, and if not, what corrective action should be taken. At the three-year mark, there would be a major review to see if the project should continue and if so, should the objectives be changed.'

8.0 EA Reference Net Functional Requirements

At **one end** of the spectrum, **EA Reference Net** can be as simple as a small group of **organizations** which share each other's EA bibliographic information as **ASCII** files through swapping diskettes. Or, **EA Reference Net** could be, an 'on-line service to provide common access to a consolidated database comprised of the combined contents of each member's EA reference files. **EA Reference Net** could also incorporate a number of other services and information sources germane to its members' EA interests.

Following is a list of functional capabilities which might be of importance to FEARO and the *EA Strategic Alliance*.

- Information exchange;
 - file exchanges within the Strategic Alliance using inexpensive magnetic media,
 - files publishing by a central clearinghouse using inexpensive magnetic media,
 - on-line access to a clearinghouse for query and downloading of selected citations.
- Information management;
 - conversion of existing files to a common database,
 - conversion of existing files to a common **superset** multi-user database in a clearinghouse on a communications network,
 - on-line and off-line update of their files by members,
 - maintaining a professional resources file.
- Messaging;
 - an *EA Strategic Alliance* bulletin board service,
 - electronic messaging between members.
- Electronic gateways;
 - gateways to public databases - e.g. **ELIAS** on **CISTI's** **CAN/OLE**.
 - gateways to university research nets and **InterNet** in the U. S.
- Professional support;
 - periodic literature surveys on behalf of the membership,
 - advisory services to members on -
 - bibliographics**
 - EA developments
 - technology.
 - support for acquisition of cited materials - inter-library lending.

9.0 Technical Options for an EA Reference Net System

The functional capabilities which the Strategic Alliance members are **interested** in supporting will determine the technical facilities required. The ways of implementing various levels of capabilities for **EA Reference Net map** into the following technical options:

- Option 1 - Informal Exchange of Diskettes;
- Option 2 - Clearinghouse Publishing of Diskettes for all Members;
- Option 3 - **iNet** 2000 Network for Information Exchange;
- Option 4 - **iNet** 2000 Network with Clearinghouse; and,
- Option 5 - **iNet** 2000 Network with Distributed Database.

While each of these options is mutually exclusive, it is entirely possible to migrate gracefully, over time, from a simple, inexpensive option like Option 1 to a full-featured more expensive option like Option 4. Each of the options are described in point form below. Each of the five options are illustrated in Figures 1. through 5. The options are summarized in Table 1. - **EA Reference Net Options Matrix** which includes indications of the cost factors. Quantified cost estimates for the options are given in more detail in *Table 2. - EA Reference Net - Costs Analysis Matrix*. Table 1. and Table 2. are located on pages 17 and 18, following the profiles of the options.

9.1 Option 1 - Informal Exchange of Diskettes: see Figure 1.

- each member would make files and updates available periodically to other members - one set of diskettes for each member;
- members could employ a common database application package for simplicity;
- members could employ agreed-to **cataloging** protocols and data structures;
- members would access data of interest locally in local files on their own PC's;
- communications for additional information/advice from sources would be met by voice, fax or mail;
- start-up costs to members are low - PC and minimal software;
- start-up costs to *EA Strategic Alliance* are nil;
- ongoing costs to members are considerable - for exporting their own files to many others and importing from many others; and,
- ongoing costs to *EA Strategic Alliance* are nil.

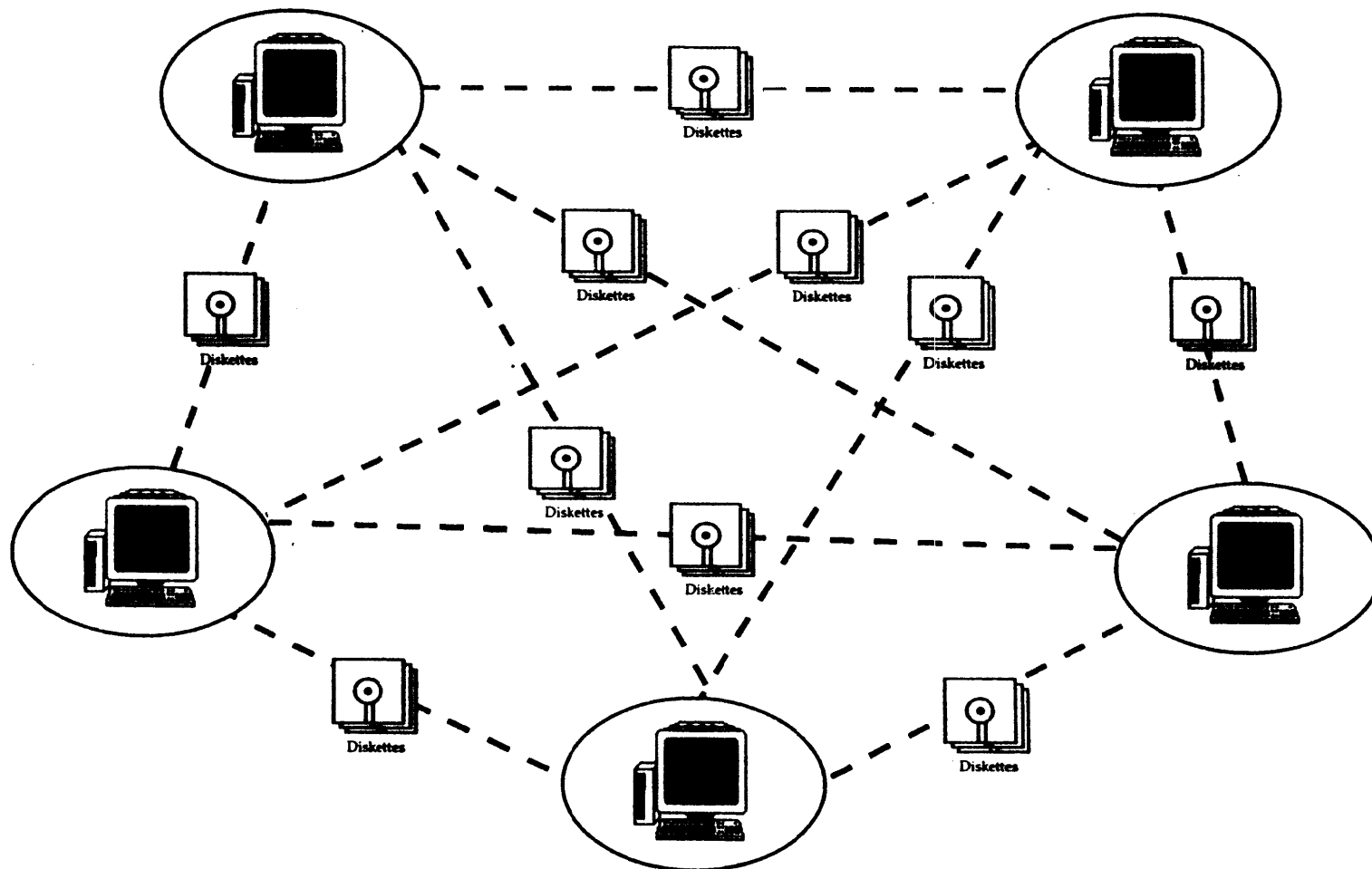


Figure 1. Option 1 - Informal Exchange of Diskettes

9.2 Option 2 - Clearinghouse Publishing of Diskettes for all Members: see Figure 2.

- **each** member would make files and updates available periodically to other members through a clearinghouse;
- clearinghouse would publish diskettes to each member;
- members could employ a common database application package for simplicity;
- members could employ agreed-to **cataloging** protocols and data structures;
- members would access data of interest locally from files on their **own** PC's;
- communications for additional information/advice from sources would be met by voice, fax or mail;
- start-up costs to *EA Strategic Alliance* are low - PC and minimal software;
- start-up costs to members are low - PC and minimal software;
- ongoing costs to *EA Strategic Alliance* are low - for file conversions, integration and publishing; and,
- ongoing costs to members are very **low** - files export and import are much more graceful.

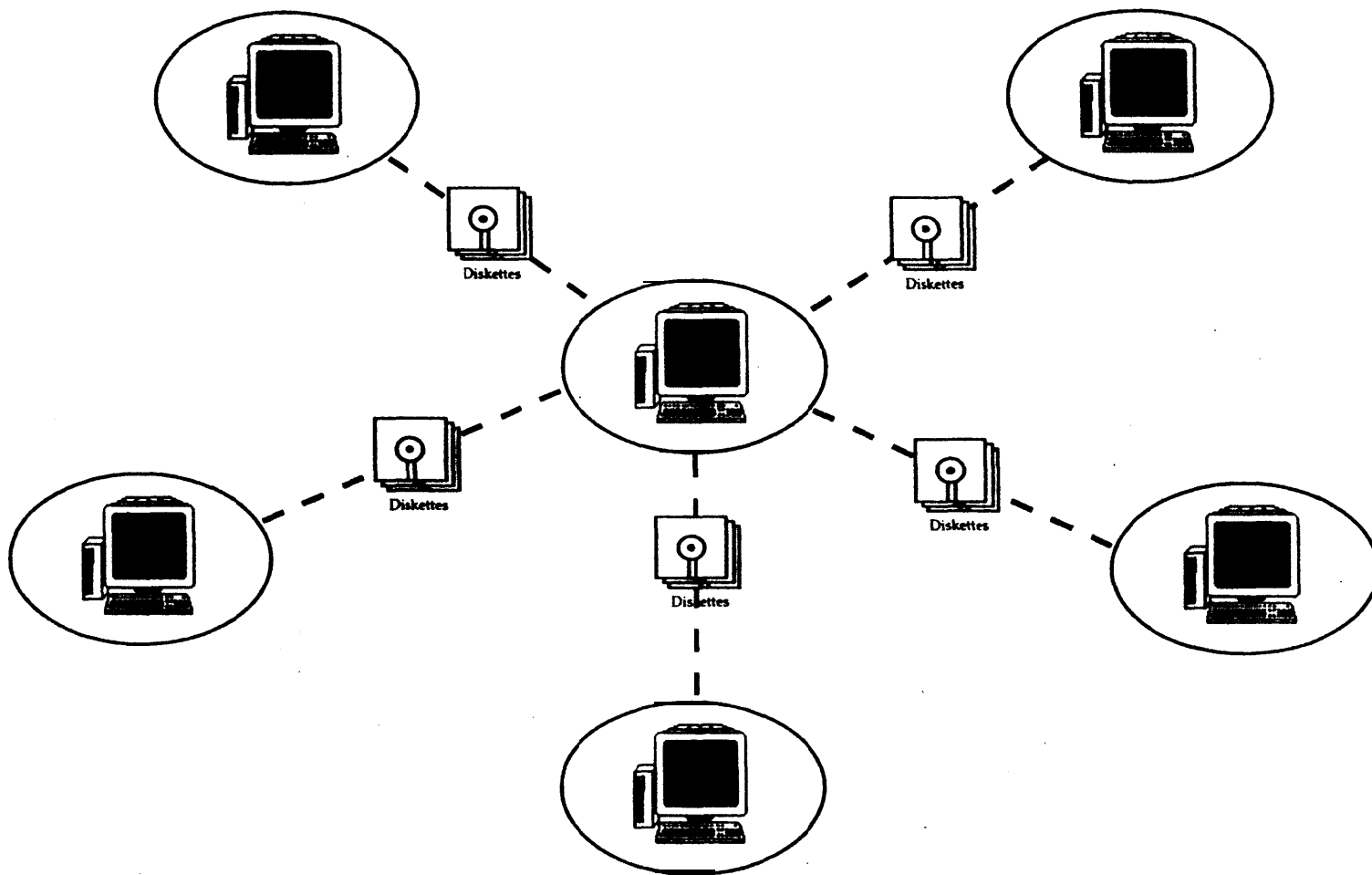


Figure 2. Option 2 - Clearinghouse Publishing of Diskettes

9.3 Option 3 - iNet 2000 Network for Information Exchange : see Figure 3.

- based on **iNet 2000** using PC's and dial-up modems;
- each member would make up-to-date files available to other members over the network;
- each node could send files or selections to others, on-line, on request;
- or, each node could support dial-in access for dumps or queries;
- members could employ a common database application package for simplicity;
- members could employ agreed-to **cataloging** protocols and data structures;
- members could download and manipulate data of interest in local files on their own PC's;
- communications for additional information/advice from sources would be met by electronic messaging over the network or by voice, fax or mail;
- messaging available via Envoy 100, a component of **iNet 2000**;
- gateway access via **iNet 2000** to public databases and TYMNET, Teleglobe and Telene t;
- **iNet 2000** would provide a simple bulletin board and gateways to many other information sources;
- start-up costs to *EA Strategic Alliance* are low;
- start-up costs to members are low if only file exchange is supported - PC, modem and minimal software;
- start-up costs to members are high if on-line query is supported - more powerful PC, modem and multi-user database and communications software;
- ongoing costs to *EA Strategic Alliance* are nil; and,
- ongoing costs to members are moderate for rigorous administration of each database to support on-line access or file dumps - communications are low - based on a per-hour charge structure determined by **iNet**.

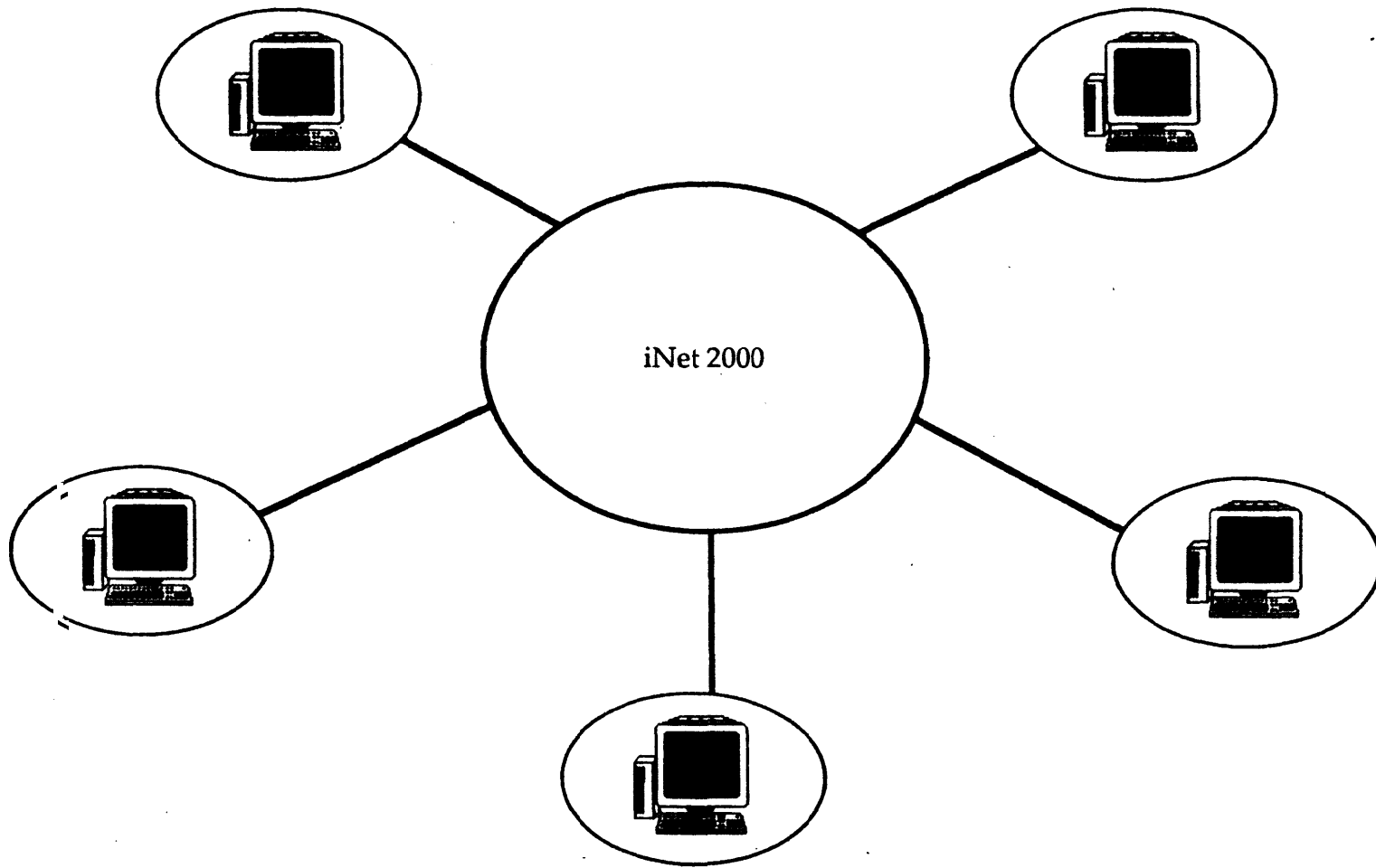


Figure 3. Option 3 - iNet 2000 Network for Information Exchange

9.4 Option 4 - **iNet** 2000 Network with Clearinghouse: see Figure 4.

- based on **iNet** 2000 using PC's and dial-up modems;
- each member would make up-to-date files available to a clearinghouse over the network;
- a clearinghouse/repository on the network would provide for responding to members' on-line queries and providing file dumps;
- members could employ a common database application package is not an issue;
- members could employ agreed-to **cataloging** protocols and data structures;
- members could download and manipulate data of interest in local files on their own PC's;
- communications for additional information/advice from sources would be met by electronic messaging over the network or by voice, fax or mail;
- messaging available via Envoy 100, a component of **iNet** 2000;
- gateway access via **iNet** 2000 to public databases and TYMNET, Telelobe and Telene t;
- clearinghouse could provide extensive bulletin board capabilities and gateways to many other information sources;
- start-up costs to *EA Strategic Alliance* are moderately high;
- start-up costs to members are low - PC, modem and minimal software;
- ongoing costs to *EA Strategic Alliance* are moderate for database management;
- ongoing costs to members are low for actual usage which is inexpensive - based on a per-hour charge structure determined by **iNet** and any additional hourly charges levied by EA Reference Net - billing by Telecom Canada; and,
- potential for income from non-members drawn from a wide - international - community of EA practitioners.

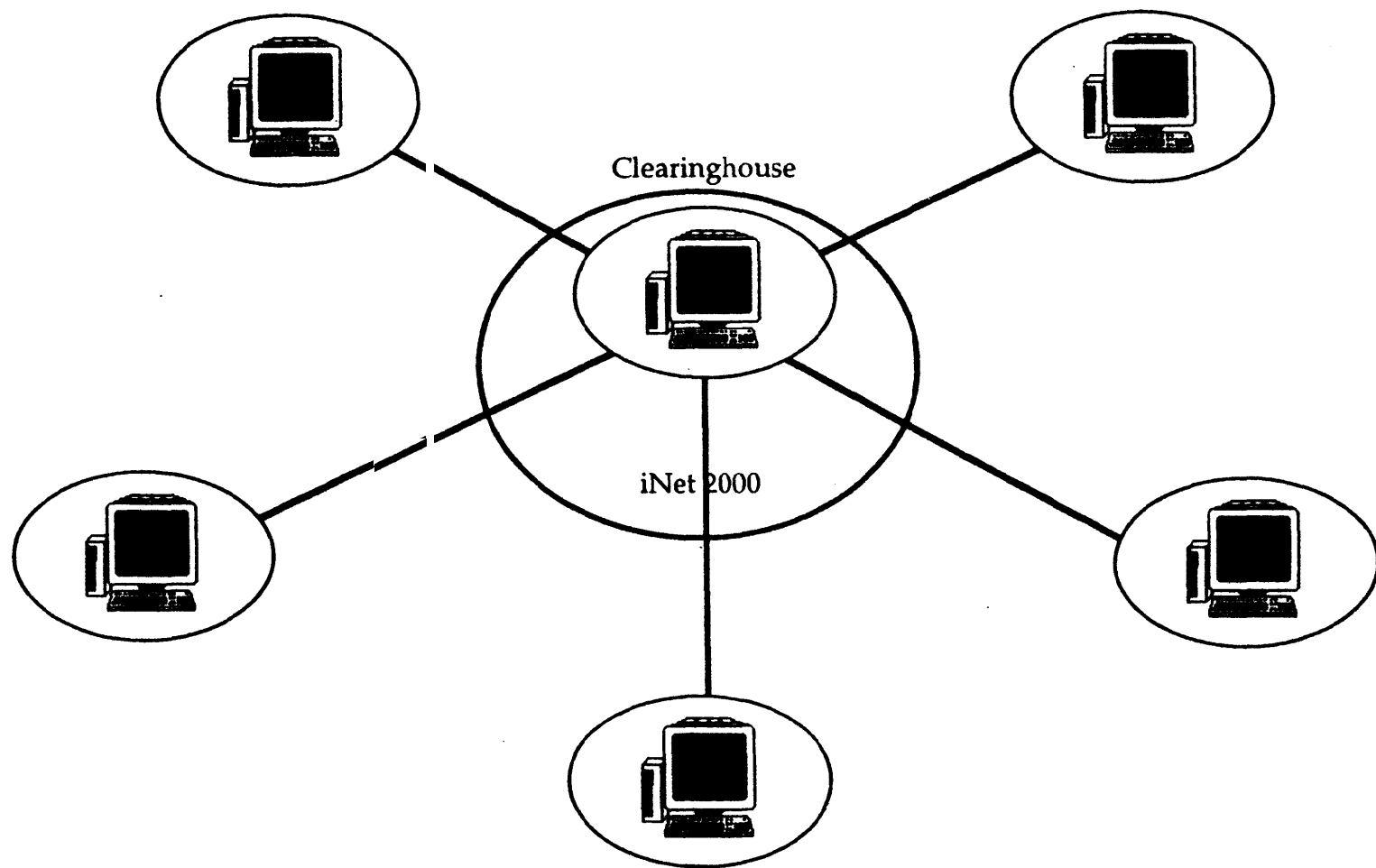


Figure 4. Option 4 - iNet 2000 Network with Clearinghouse

9.5 Option 5 - iNet 2000 Network with Distributed Database : see Figure 51.

- based on iNet 2000 using linked SQL databases which emulate a single database, and powerful PC's with dial-up modems;
- each member would maintain a subset of the common database on the network;
- very powerful, common database application package is required;
- requires well-defined, agreed-to, **cataloging** protocols and data structures;
- members would have transparent, realtime access to all data in all bases;
- users would not know or care where data resides - database system would search all databases and return data meeting search criteria;
- communications for additional information/advice from sources would be met by electronic messaging over the network or by voice, fax or mail;
- iNet 2000 would provide a simple bulletin board capabilities and gateways to many other information sources;
- start-up costs to *EA Strategic Alliance* are high;
- start-up costs to members are prohibitively high - high 'performance PC, modem and very expensive software;
- ongoing costs to *EA Strategic Alliance* are high for technical support and administration;
- ongoing costs to members are very high for system administration, database administration and communications management; and,
- potential for income from non-members drawn from a wide - international - community of EA practitioners.

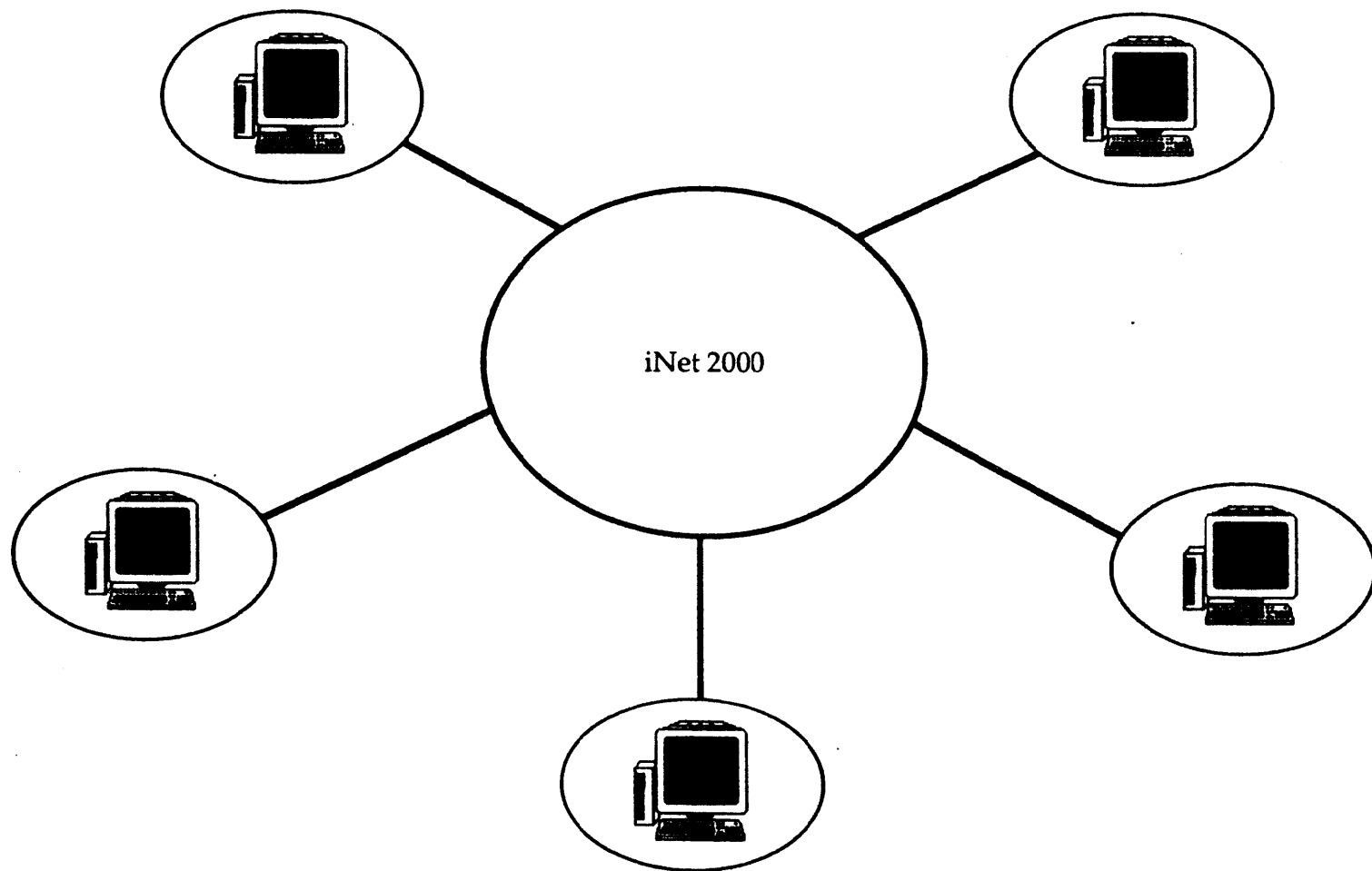


Figure 5. Option 5 - iNet 2000 Network with Distributed Database

System Options	Description	Advantages	Disadvantages	Cost Factors
Option 1 Informal Exchange of Diskettes	Members swap files and updates to Put into their own databases	Simplest technology Files on-site - only local access required	Awkward and not very effective Requires much duplication of effort Or, requires standardization	Low direct cost Labour intensive and time consuming
Option 2 Central Publishing of Diskettes for all members	Clearinghouse receives , integrates and re-publishes consolidated files	Accommodates diversity of data structures Reduces duplicated effort	Each member needs searchable database to do queries Does not encourage communication among members	Low direct cost for members Low cost for clearinghouse Minimum time and effort for members
Option 3 Dial-up Network for Information Exchange	On-line version of Option 1 with message exchange and simple bulletin board capability	Minimum infrastructure No central costs	Difficult to operate Requires active involvement of both parties to set up and conduct the exchange of files	Low direct cost for members No central costs High overhead for actual exchange information
Option 4 Dial-up Network with Clearinghouse	On-line version of Option 2 with on-line query and extended bulletin board capability	Very easy to use and transparent Maximum flexibility Excellent growth potential Potential for attracting paying users	Requires central administration function	Low direct cost for members High one-time costs for clearinghouse Moderate maintenance costs
Option 5 Dial-up Network with Distributed Database	Members' databases become a common database via the network	None for this application	Very complex and high -powered architecture Requires full integration and rigorous standardization	Prohibitively expensive

Table 1. - EA Reference Net - System Options

Cost Items	Option 1 Informal Exchange of Diskettes	Option 2 Central Publishing of Diskettes	Option 3 Dial-up Network for Information Exchange	Option 4 Dial-up Network with Clearinghouse	Option 5 Dial-up Network with Distributed Database
Project Planning	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Project Initiation	\$5,000	\$10,000	\$10,000	\$10,000	\$10,000
Requirements and Design	\$2,000	\$5,000	\$3,000	\$20,000	\$20,000
Implementation	nil	\$6,000	\$15,000	\$10,000 and \$35,000 purchase (or, \$1,000/month)	\$20,000
Ongoing support - Members	\$5,000/year/each PC and database	\$1,000/year/each PC and database	\$5,000/year/each PC, modem, telecom database software	\$1,000/year/each PC, modem, telecom database software	\$10,000/year/each \$40,000 system/each
Ongoing support - Alliance	nil	\$3,000/year	\$18,000/year	\$15,000/year	\$75,000/year

Notes on Cost Factors

University in-house labour estimated at \$200.00 per day including overhead

Contractor System Analyst support labour estimated at \$350.00 per day including overhead and profit

Data entry cost per hard copy record estimated at \$1.00 per record of 500 characters

Record conversion/clean-up cost per **datafile** record estimated at \$0.35 per record of **500** characters

Use of EA Reference Net services costs 0.15 per minute plus **any** EA Reference Net surcharges

Use of public databases via **iNet 2000** costs **from \$1.00** to \$2.00 per minute plus file capture costs for down loaded files

Use of other **iNet 2000** services alone costs \$0.15 per minute

Estimated cost of members' hardware and software:

PC - **\$1,500.00** and up

Modem - \$400.00

Communications and database software - \$800.00

Table 2 • EA Reference Net • Costs Analysis Matrix

10.0 Proposed Implementation Plan

Regardless of the technical option(s) chosen for **EA** Reference Net, a disciplined project implementation process will be required. This paragraph below outlines the steps in the process for the most comprehensive, acceptable technical option - Option 4 **iNet** 2000 Network with Clearinghouse.

10.1 **Project Planning**

- Circulate discussion paper
- Conduct EA Strategic Alliance Workshop
- Identify, prioritize and resolve issues
- Gauge interest and commitment levels
- Establish interim management structure
- Assign responsibilities
- Choose an option

10.2 **Project Initiation**

- Establish goals and objectives
- Determine how the project will be organized, managed and operated
- Establish detailed requirements for selected option
- Prepare project plan
- Agree on budgets and sources of financing
- Establish MOU's and contractual arrangements

10.3 **System Requirements and Design**

- Determine what **cataloging** standards and protocols are required, if any
- Decide on approach to database development and implementation
- Identify growth and migration options and priorities
- Establish system architecture - if any
- Establish system design - conceptual/logical/physical - as required:
 - Bibliographic structures
 - Database application
 - Network
 - User system

10.4 **Implementation**

- Set up information exchange protocols
- Assist users to establish PC-based systems - if required
- Receive, convert and merge data - if required
- Establish services - as required

10.5 **User Support if required**

- Prepare documentation - if required
- Prepare and deliver training - if required
- Provide on-going support - as required

11.0 Costs and Financial Considerations.

11.1 Cost Estimates

Cost estimates for each of the technical options and typical services, are given **Table 2. - EA Reference Net - Costs Analysis Matrix**. Note that these estimates do not include the costs of developing catalog, index and keyword **schemas** or for **cataloging** and indexing citations themselves. Further, it is assumed that the Dalhousie University SRES EA Reference System is fairly representative of the **catalog** structures to be handled in **EA Reference Net** and that the record formats and sizes are **also** typical.

11.2 Possible Income

It might be useful to publish the files of **EA Reference Net** on magnetic media like floppies for the EA community at large. If such a service were **publicized** by FEAR0 there might be significant income potential. Or, the service might be a means of attracting *EA Strategic Alliance* members

An on-line **EA Reference Net** might also be very attractive to outside users who could be charged on the order of \$40.00 per hour for access plus downloading charges of, for **example**, \$1.00 per record. Income from this source might be as high as \$10,000 per year with an active outreach program.

12.0 **EA Strategic Alliance Workshop Agenda**

The suggested agenda for the *EA Strategic Alliance* Workshop is outlined below.

- Introduction;
- Walk-through of the Feasibility Report;
- Tabling of Issues;
- Open Discussion of Issues;
- Resolution of Issues;
- Selection of System Option;
- Commitment of Resources; and,
- Action Plan and Responsibilities.

13.0 Issues to be Resolved

Listed below are a number of issues related to EA Reference Net which need to be addressed by the *EA Strategic Alliance* workshop. The list is certainly not exclusive and it is expected that the workshop participants will raise additional issues:

- Policy
 - The goals, objectives and terms of reference
 - The role of FEAR0 and its commitment to continue support
 - Governance roles of FEAR0 and the membership
 - Responsibilities of FEAR0 and the membership
 - Financing the network and the extent of user-pay
 - Approach to the Memorandum of Understanding
 - Whether growth is to be encouraged or discouraged
 - Open access or closed access - for non members
- Requirements and Priorities
 - Whether information exchange will be by diskette or on-line
 - Need for a clearinghouse service
 - Need for on-line or off-line maintenance of databases
 - Need for electronic messaging and bulletin board
 - Need for acquisition/lending of cited works
 - Need for access to outside, public databases
 - e.g. - Environment Canada's ELIAS on DOBIS
 - Need for advisory services
- Protocols
 - Approach to **cataloging** and **bibliographics** for new citations
 - Updating cycles and procedures
 - Access controls and procedures
 - Standardization of various information sets versus accommodation of diversity