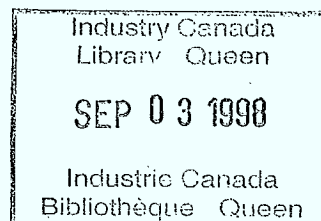An Information Network for

Software and Computer Services

Concept Paper

Microstar

SOFTWARE LTD.

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Software and Computer Services :

Concept Paper

Prepared for: Communications Canada

Prepared by: Microstar Software Ltd

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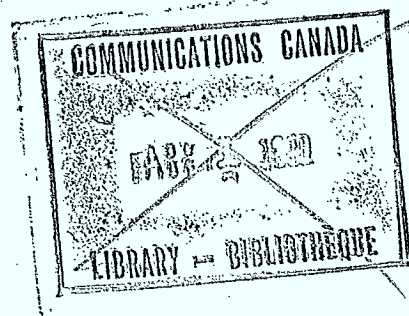
Table of Contents

1.0 Executive Summary

This paper has been prepared for Communications Canada (COM). It contains a conceptual framework for an Information Network for Software and Computer Services (INSCS). The impetus for such a system stems from the recognized need within government and industry to provide a vehicle by which the Canadian Software and Computer Services (SCS) sector can be promoted both within the country and abroad. Communications Canada recognizes the fundamental importance of software to the future economic wealth of Canada.

In a report entitled - "Profile of the Canadian Software Products Industry" - recently published by the Department of Regional Industrial Expansion (DRIE) a number of problems are listed which must be addressed within the SCS sector if the full potential of this key Canadian economic resource is to be realized. This report pointed out that the SCS sector lacks a unified infrastructure on which to promote future growth. This results in poor intersector communication which in turn results in wasted and duplicated marketing and development effort. Other problems listed included: woefully inadequate funding for R&D and venture capital; foreign competition capturing the domestic market because of superior marketing skills and budgets; and government procurement policy which does not promote the buying of Canadian products and services. These and other issues will continue to suppress the impact of the SCS sector on the Canadian economy.

No system can be a panacea for the resolution of all the issues facing the SCS industry. Nevertheless, a system that promotes the sharing of knowledge, the sharing of financial and human resources and the acquisition of domestic products and services will have a major impact on the industrial and regional development of the sector. The system proposed in this paper is specifically targeted at the resolution of the issues noted above. It will foster communication within the supplier and user community because it will be online and easily accessible across the country. An accurate and current list of resource and product needs will present suppliers with immediate access to potential buyers. This will reduce the demand on critically short marketing funds and resources.

There are existing government systems containing data relevant to the proposed Information Network. Accordingly, this must be an interdepartmental initiative. For example, the sourcing systems of SSC, the supplier identification and tracking systems of Consumer and Corporate Affairs, as well as the commodity classification systems of Statistics Canada will provide some of the key information. Use of these sources will reduce implementation time frames and costs.

The project is considered to be a medium scale system integration task with an initial hardware and software

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acquisition cost of 2 - 3 million dollars. Development of the system is expected to require 2 years at a cost of 14 - 19 million dollars. Annual operating costs are estimated at 1.5 - 2.5 million dollars and are sensitive to the communications traffic volume and billing strategy. Lower operating costs can be achieved if the communications cost is born by the user. A project budget has been estimated at 20 - 30 million dollars for development and the first three years of operation.

The conclusion after consideration of the problems facing the SCS sector is that the proposed Information Network is essential to the long term well being of this industry. It will provide the intimate infrastructure for the industry to coalesce and compete agressively within an ever more sophisticated market. It will promote the optimum use of scarce R&D and marketing funds by providing online access to a vast information base. It will reduce the tax burden through the promotion of shared products and services. It will significantly enhance the future success of one of Canada's most important resources - expertise and knowledge of the information business.

2.0 Situational Review

This section highlights the reasons why the need for a National Network for Computer Software and Services has evolved as a national priority.

2.1 The Requirement

International Data Corporation (Canada) Ltd predicts that the Canadian Software and Computer Services (SCS) sector will grow by an annual rate of 9.4% reaching 1991 sales of $2.8 billion from a 1985 base of $1.6 billion. These sales fall into three major categories, namely: packaged software, professional services and processing services. Each category currently represents about one third of the total sales. A gradual dominance is expected in the packaged software component as system design techniques mature enabling a broader range of problems to be addressed by off-the-shelf solutions.

However, if Canada is to realize the potential of this national resource, there are a number of problems to overcome. The following summary of major issues facing the SCS industry is from a DRIE report entitled "Profile of the Canadian Software Products Industry".

Infrastructure

No unified voice for the industry exists because of its fragmented nature. This inhibits communication between firms and related organizations. The proposed system will facilitate and promote an ongoing dialogue within the industry through an international communications network. It will increase the number of partnerships with a common market goal and will spread market risk among the partners.

Finance

Less than 20% of Canadian venture capital finds its way into high tech and less than 4% is invested in startups. The resulting $20 million per year is grossly inadequate for such a research intensive industry sector. With a high profile and highly organized system such as the INSCS, it is expected that sources of venture capital will be more readily accessible. The market research data available on the system will in itself alleviate an often difficult problem — finding the market potential for a product or service for the purposes of preparing a business plan. In addition, it will promote the forming of strategic alliances and partnerships making fund raising more effective and investment less risky.

Foreign Competition

Foreign governments very often finance the development stage of new software products through R&D grants and other routes. The foreign developer, therefore, only needs to raise financing for the commercial exploitation of the product. This creates unfavourable price differentials between the foreign product and a similar Canadian product that was developed solely through the venture capital route. The result is a lack of knowledge concerning Canadian products because marketing money is scarce and most often spent in developing the US market. The INSCS will considerably improve the Canadian perspective so long as foreign products and services are not provided access to the system.

Government Support

It is widely held that government support is essential to the full realization of the SCS industry potential in Canada. Government procurement policy is favoured as the mechanism to increase the flow of funds into the SCS sector particularly with the impending Canada – US free trade agreement. Funding initiatives for R&D and marketing should continue to expand and become more closely aligned with industry needs. By taking the lead in introducing this system, government will be providing much needed support to the SCS sector. The flow of Canadian products and services into government will improve.

Research and Development

R&D expenditure in Canada as a percentage of gross domestic product is less than half that of Germany, Japan and the US. The long lead times for the commercialization of Basic Research (carried out mostly in universities) greatly increases the risk associated with producing a successful product. The effect of the INSCS on R&D is less predictable than on the sales cycle. However, with increased sales, the industry may be in a position to incur more R&D expenses provided taxation policy is favourable.

Marketing

There is no major Canadian software publishing industry. Therefore, Canadian software developers do not have ready access to Canadian much less larger world markets. The full potential of the industry cannot be reached without this fundamental capability. The INSCS is not a replacement for a vigourous marketing activity by industry. It is a tool which can considerably enhance the effect of an ongoing promotional thrust within the sector.

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Market Intelligence

Lack of market intelligence results in wasted development effort. In addition, potential commercial product opportunities are not identified early enough. Terminology differences make comparisons of data difficult if not impossible. The system will promote standardization and will, therefore, make comparative analysis more easily performed. It will provide a central source of data regarding demand for certain vertical sectors.

Human Resources

The SCS industry is dominated by small companies. These companies do not have the financial resources to attract and retain highly qualified marketing and business development personnel. As has already been mentioned, the INSCS will assist companies with scarce resources to promote products and services on a wider scale.

Barriers to Trade

Problems in this area result from foreign immigration policies that prevent support personnel from working in a foreign jurisdiction and require withholding taxes on royalties. The current free trade proposals can impact on this problem. The system will be a vehicle to introduce and promote Canadian products and services in the US via common electronic network access.

In a recent document published by Communications Canada and entitled "Communications for the Twenty-first Century", the federal government's position on the importance of the SCS sector to Canada was stated as follows:

"...software...may be the single most important commodity in ensuring future national economic success."

If Canada is to succeed in elevating the Computer Software and Services sector to heights which truly reflect the potential of this national resource, a major initiative is required. A system which can network suppliers and consumers at all levels of government including federal, provincial and municipal and, as well, business is essential. This paper presents a concept for such a system including benefits, major components, and budgetary cost estimates.

2.2 Objectives

The problems facing the SCS sector have been recognized by the federal and provincial governments. A number of federal and provincial incentive and assistance programs are targeted at relieving these problems. However, procurement practice, awareness and intra-industry communication are considered by some to be effective vehicles for the improvement of the performance of the SCS industry. Therefore, Communications Canada, in cooperation with Supply and Services Canada is developing a concept for an automated Information Network for Software and Computer Services. The objectives of the system are discussed under the following headings.

Industrial Development

The SCS industry affects virtually every sector of the Canadian economy. The proposed system to enhance the potential of this rapidly growing industry will:

- provide industry with a vehicle to promote products and services both in government and internationally;

- reduce the reporting burden to government by promoting shared data within government;

- promote technology transfer from government labs to industry for commercial exploitation;

- provide industry with a vehicle to seek strategic partners in an effort to overcome the relatively small size of the average Canadian supplier;

- promote the development of new technology through procurement strategy which will be an advantage for Canadian suppliers in a free trade environment.

Regional Development

The equitable distribution of federal procurement across provinces is an ongoing concern of the provincial governments. There is a predominance of procurement within Ontario and Quebec. A number of task forces are studying ways to improve the distribution of procurement in the public sector. The proposed National Network will:

- provide national access to procurement needs through an electronic network. All companies with the appropriate access equipment will be able to compete for national opportunities as they arise;

- promote regional development of new entities because the SCS sector does not require a local industrial base in

order to thrive. With a National Network, strategic partnering can be effected regardless of geographical factors;

- improve government/users intelligence on regionally based industry;

Government

The requirements of government are becoming more complex and pervasive. Many departments share a common need for information in support of social and economic policies. Duplication of development effort results in increased tax burden and increased paper burden. The National Network will:

- improve government/users market intelligence by providing a current list of suppliers, products and services;

- improve government/users knowledge by providing a common method of evaluating products and a common source of evaluation data;

- provide a vehicle for the exchange of custom solutions developed for the government;

- provide industry and government with a current list of procurement opportunities;

- provide industry and government with a common communications network;

- reduce duplication of industry information both manual and automated by promoting shared use of industry information;

- provide a vehicle for linking to other key data bases such as the AIM system of the Federal Business Development Bank and the proposed DRIE/NRC databank of R&D activity.

2.3 Benefits

The benefits to industry and government which can accrue from an electronic Information Network are pervasive. The communications infrastructure which would be put in place should foster cooperation and joint venturing in the industry. There will be a focal point represented by both industry and government which would involve the most fundamental operating need of companies - sales. This will promote vigorous participation when issues arise. It is difficult to draw any conclusions at this stage as to the effect the system might have on the availability of investment capital. If the system is exploited in the procurement process as it should be, a dramatic effect on foreign market share should result. The system must promote "Buy Canadian" or a fundamental objective will not be met. While not intended to replace the need for a bona fide Canadian software publishing entity, the SCS Information Network will prove to be a powerful resource in support of this key activity. The resulting improved financial flows will see fewer business failures, more R&D and better positioning for foreign thrusts by Canadian products. Perhaps, therefore, it is not unreasonable to surmise that a healthier industry with fewer failures would become more attractive as an investment vehicle.

In addition, the following specific benefits have been enumerated relative to the problems facing the SCS industry sector:

- a cost effective procurement vehicle for government and industry;

- maximized exposure of the Canadian Software and Services industry;

- increased partnering of both government and industry resulting in more competitive products and services;

- more effective use of government incentive and assistance programs;

- shorter procurement cycle for off-the-shelf products;

- reduced paper through government promotion of system usage. A cost reduction will result from less duplication and from the fact that industry will be responsible for providing updated information;

- rapid dissemination of new product and services offerings;

- more equitable national distribution of procurement.

3.0 System Conceptual Design

3.1 Overview

Many independently maintained government information systems contain data concerning the SCS sector. This data is collected through statistical surveys, current sourcing systems, corporate filing regulations, incentive programs and so on. As well, there are other initiatives currently being undertaken which will provide alternative sources of data on the SCS industry. A conceptual system framework for an Information Network has been developed that can take advantage of these sources where applicable yet that can function as an independent entity. This approach is considered to be essential if the system development and maintenance costs are to be kept reasonable and the implementation timetable kept as short as possible.

The components of the proposed Information Network are depicted in Figure 1. Suppliers will, in general, be responsible for maintaining the supplier information which includes tombstone data and product and services profiles. Government will be responsible for ensuring that procurement opportunities are maintained accurately and in a timely fashion. Procurement data encompasses the current Request for Proposal process and attempts to automate the response mechanism to improve cost and to promote access by a wider industry contingent. The Contracts Let data will provide industry with an inventory of ongoing government needs. When a significant new initiative is being planned, it will appear in the Concepts component. Industry will be in a position to peruse these proposed initiatives and will be able to contribute technical and economic advice. In addition, government will be responsible for maintaining the Software Exchange and Software Evaluation data. These two elements will result in significant economic benefits. The evaluation data will reduce risk in the procurement process and the exchange data will promote the sharing of already developed systems.

The relationships among suppliers and users of the system are depicted in Figure 2. Users and suppliers will gain access to the system through a national communications network. Users will include government, associations, market researchers and industry itself. Suppliers will include all levels of government as well as industry. Facilities will include electronic mail and the ability to append value added services as such services are deemed necessary.

Each component of the system is described in the following subsections. The descriptions represent the minimum system functionality considered necessary in an initial implementation of the Information Network. Potential data elements for the various system data bases are provided in Appendix A. Additional system functionality and related data requirements will, no doubt, be uncovered during the early stages of the system design.

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Figure 1: INSCS Major Components

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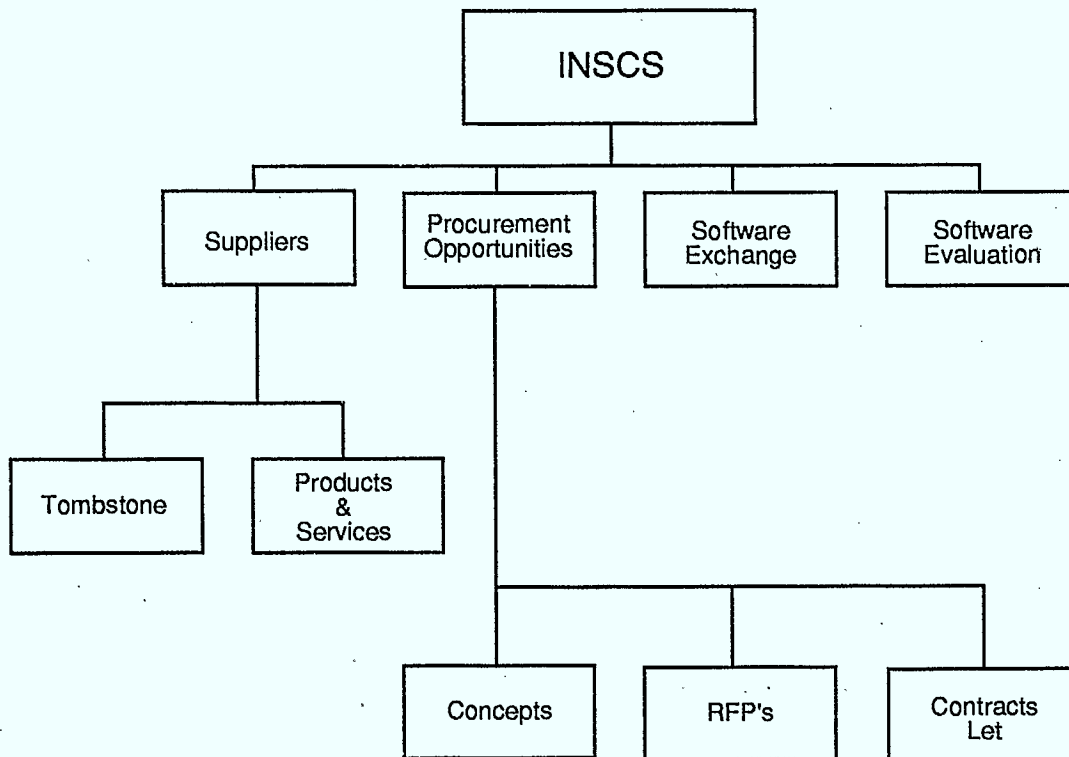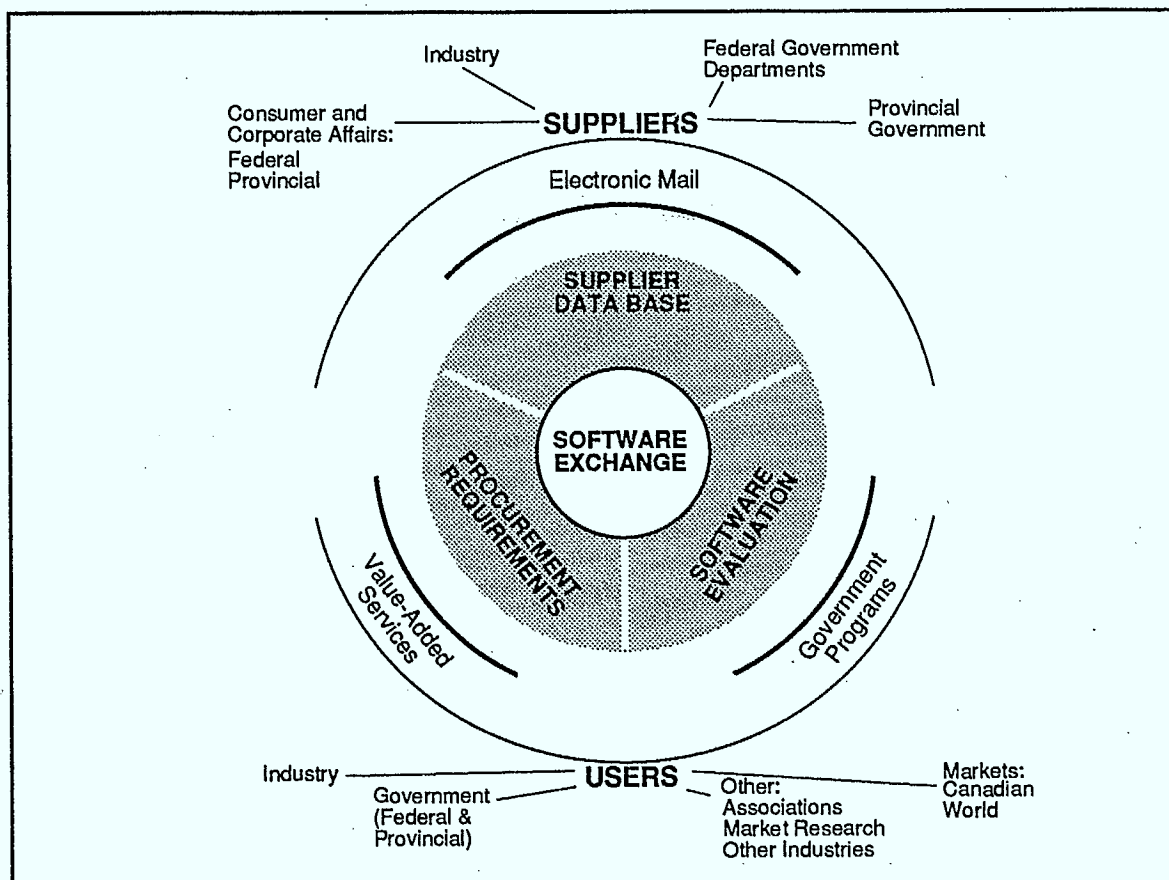
Figure 2: INSCS Supplier/User Relationships

Figure 2: INSCS Supplier/User Relationships

3.2 Suppliers

The Suppliers data base will contain three groups of data: tombstone, products and services. This will be the most volatile data in the system because the birth and death rate is high; new product introductions and new releases of existing products are frequent; pricing strategies are evolutionary and are subject to competition; and the consulting service supply side is in constant flux.

Since the system will be online and transactional in nature, suppliers will be able to electronically enter and update the required information. This process must be made as easy to use as possible. For companies that are not equipped to access the system electronically, a manual input system can be provided or a service bureau approach can be taken.

3.2.1 Tombstone data

The most basic and relatively stable data concerning a supplier is in this category. It includes name, address, communications facilities and federal and provincial identification numbers. Determination of new suppliers and tracking of the viability of existing suppliers is a very difficult problem because they may not be registered provincially or federally as limited corporations. This raises the question as to whether a supplier is responsible for initiating entry to the system or whether the government should bear this responsibility. One assumes that suppliers, if notified about the system by advertising or other means, would be eager to be counted in.

3.2.2 Products

The maintenance of product data is logically the responsibility of the supplier. The Information Network should provide the supplier with the facilities to add, modify or delete product specifications as required. Any changes to product data must be accounted for in performance evaluation data which is maintained elsewhere in the system. If not handled appropriately, a previously logged performance problem could be corrected in a product but this correction would not be reflected in the evaluation data.

A product classification scheme which facilitates online searching must be provided. There are many product or commodity classification coding schemes available. However, there is a lack of detailed coding for software and services. More work must be undertaken in this area in order to develop a scheme which can be utilized now and which can evolve as the SCS industry grows. The classification methodology must be able to cope with the coding of integrated products which fall into several functional categories. A classification structure for

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Software and Computer Services developed for DRIE has been included as Appendix B.

3.2.3   Services

As with Products, the maintenance of services data must be the responsibility of the supplier. However, the classification of services is somewhat less volatile than that of products. Services tend to be organized under broad categories such as "Communications Consulting" with specializations such as "RS232, LAN, X.25, HDLC, etc". In order to provide sufficient data and make searches more productive, experience with generally accepted commercial products should be reflected in the classification scheme. This may proliferate the coding but would be highly beneficial. The data base would take on a hierarchical format. Searches may occur on the high level category or on the specialization or both. Quantifying performance is considerably more subjective than for products. Customer references and testimonials will play a more significant role. The classification structure for Software and Computer Services developed for DRIE addresses the Services sector.

3.3 Software Exchange

The purpose of the Software Exchange is to promote the sharing of software investment among government departments. This will reduce the cost of developing systems which have similar functions across a wide base of users. The current investment in software which falls in this category is estimated at $2 billion.

In addition to the software developed in government for government, industry developed software will also be identified on the data base. An objective of the Software Exchange will be to isolate software which could be transferred to industry and commercially exploited. This initiative will further enhance the economic benefits of government software development activities by creating jobs, promoting exports and increasing the general wealth within the industry.

Initial data for the Software Exchange would be supplied by SSC. However, the intent is to gather information from all completed contracts on a government wide user department basis. Users in the government and private sectors will be able to match needs with available products and services.

3.4 Procurement Opportunities

This is the demand side of the system. In the Procurement data base, there will be three categories of needs, namely: those being requested through a proposal route, those of ongoing projects, and those being developed at the concept stage. The first or Request for Proposal category is an identified need which may or many not be met depending on an analysis of various supplier proposals. The second category represents a real demand. The third is conceptual and will not necessarily result in a Request for Proposal. Requirements in the third category may be responded to spontaneously by a supplier in the form of an Unsolicited Proposal. The three categories are described separately in the following subsections.

All government departments as well as industry will have access to the Information Network. The access can be international. Because the inventory of needs is electronic, it can be kept current. This is a significant advance over the existing system which can exclude some suppliers from opportunities. Indeed, in some cases where responses to tenders are not expected to be extensive, the tendering process can be handled online. The legal aspects of such an activity are being addressed by the Queens Printer where a similar system is being developed for printing requests.

The Information Network will have the benefit of increasing the opportunities for industry to sell to government. This will have the effect of encouraging competition. Both purchasers and suppliers will benefit from the reduced amount of paperwork required to effect a transaction through the network. The resulting cost savings may be passed on through competitive pricing strategies. Direct online access to supplier information will encourage purchasers to shop around rather than employ a hit and miss strategy for selection of a supplier. Nevertheless, it is the responsibility of industry to maintain accurate information on the network and to continue to market through all available channels.

3.4.1 Requests for Proposal

This is the tendering process most familiar to government suppliers. Completely under the jurisdiction of SSC, Requests for Proposal are sent to various suppliers as a result of departmental procurement needs. Often, a letter is sent to a larger number of suppliers requesting price and availability information before the RFP is distributed. This practice was instituted in an effort to reduce the overhead associated with printing, distributing and analyzing the responses to large RFPs.

Awareness/National Distribution

Industry must be made aware of procurement opportunities.

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National electronic access will increase regional participation and will more equally distribute procurement opportunities. Online access to these needs will improve awareness and transfer the responsibility for "knowing" into industry's hands. The response time for RFPs is often too short. Early awareness can reduce this chronic problem. The improved knowledge which will be available to government will promote partnering through the matching of diverse needs to multiple suppliers.

Responsiveness

An online mechanism for responding to RFPs will enhance responsiveness. In addition, if standard measurement criteria are utilized to rank responses, more companies can participate in a shorter period of time. This can be advantageous to the user if time is of the essence. It will also promote a competitive spirit and promote access by a larger industry contingent.

The RFP data base is multifunctional and requires careful design if it is to achieve maximum benefits. The data contained on this data base is fundamental to industry and government. It must provide industry with a healthy and unbiased forum to compete for government dollars and it must provide government with the best quality of goods and services.

3.4.2 Contracts Let

Resource needs for ongoing projects fall mainly into the services sector. Budget approval has already been obtained for the project and the normal fluctuations in development effort are being accommodated. It is likely, if a supplier is already the prime contractor on a project, that the user will seek further resources from the same supplier. If the current supplier is in a position to provide the necessary resources at a competitive price, it can be advantageous for the user to utilize them. The administrative burden can often be minimized and there may be synergy with resources already on the project. If the prime contractor can not supply all necessary resources for either a government project or one of their own undertakings, alternative sourcing can be achieved if adequate information is online. The needs of prime contractors can be made available online to sub-contractors who can make resources known on a real time basis.

The Contracts Let data base will be used mostly by government procurement personnel. Therefore, the burden of updating lies in the government user areas. Online access by departments must be provided if it is to function in a meaningful way. To ensure uniformity when specifying a particular requirement, a standard classification is essential for the products and services being sought. This requirement is compatible with that of the Products and Services data bases associated with the Suppliers. A comprehensive classification

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system will serve as a common language and will "glue" the various data bases together from a user access point of view.

3.4.3 Concepts

Software needs constantly arise within the context of ongoing government operational and planning activities. These needs are expressed in a variety of ways such as "What if" and "Has anybody heard of" scenarios. The problem being addressed may not directly relate to software but there is a notion that "computers" may be able to facilitate the solution.

The problem exemplified above is a candidate for the Concepts data base. If funding and program approval has been obtained, however, the Concepts data base is not the appropriate repository. Care has to be exercised to avoid using this data base as an idea generator for problem analysis. It´s purpose is to provide industry with a barometer which measures the direction of thinking within government rather than to provide an alternative to creative proposal writing and price and availability responses. This component serves an important function by bringing industry creativity into government needs analysis at an early stage.

The data required for this data base is descriptive in nature. Some classification of the general field of endeavour may be possible but the ability to maintain free form is essential. This being the case, it follows that a text search facility will be helpful in the Information Network.

3.5 Software Evaluation/Canadian Software Products Assessment
     Centre

     The purpose of the Software Evaluation data base is to
provide objective data on the performance of software products.
There are no widely accepted standard methodologies for testing
and evaluating products. This makes the Software Evaluation data
base potentially the most controversial component of the
Information Network.

     Certainly, many readers are familiar with the evaluations
found in industry journals and other publications. These defacto
authorities are "what's available". Canadian software is rarely,
if ever, to be found in the tables of cross referenced data found
in these industry rags.   Whether the approach adopted in the
industry literature is sufficient and usable for this system is
questionable.

     An alternative does not quickly present itself.   This is
partially due to the lack of a common framework within which the
industry can measure itself.   It is also partially due to the
fact that no matter what methodology is used, much of the
rating data is based on subjective rather than scientific
measurement. For example, whether a product has a "user friendly
interface" is a personal call.   One evaluator may prefer a menu
format and another a command format.

     With this in mind, it is proposed that the software
assessment data base contain information derived from actual
end users.   This can be in the form of testimonials or narrative
comments. In the absence of end user information, baseline
performance data will be established by the centre against
claimed technical specifications.   If a product has been
evaluated in a journal, the supplier may wish to reference this
fact by providing the appropriate publication identification
data.   Reproductions of the relevant articles can be referenced
in the Product data base under promotional materials.

     To   assist   in the promotion   of   Canadian   software,
Communications Canada has proposed the establishment of a
Canadian Software Products Assessment Centre.   The key role of
the   centre is to validate the technical and   performance
specifications of Canadian software products.   Such information
is currently not available.   The derived information will reduce
the risk associated with selecting software.   Products can be
demonstrated at the centre and the centre will be actively
promoted to the government community.   The centre would play a
role   in   the evaluation process by establishing   minimum
performance standards for products on certain hardware
configurations.   As well, the centre would contribute to the
evolution of Canadian products by injecting real life experiences
and needs into the supplier's development plans.   The content of
this data base requires analysis and is to be considered within
the scope of the Information Network project.

4.0 Technical Environment

4.1 Overview

This section presents some of the technical considerations which are important to the overall success of the Information Network. It addresses at a high level the provision of access to the system by users and suppliers, the characteristics of system hardware and software, and the national and international standards that are applicable. Many of the components are available from Canadian suppliers and there are a number of companies with the required systems integration experience to manage the project.

4.2 Communications Infrastructure

The vast geography of Canada makes economical national access to the system a high priority. The availability of a local access point without incurring long distance charges is essential. Such services are provided by the DATAPAC network or the iNet network offered by Bell Canada. The final choice will depend on the degree to which the Information Network is regionalized and/or otherwise distributed around the country. In general, a packet switched technology is desirable. Any choice of communications technology should be upgradable at low cost when services such as Integrated Services Digital Network (ISDN) become available.

4.3 Hardware Platform

The volume of information to be processed and the size of the community indicate that a mainframe or cluster of minicomputers will be required to maintain adequate service levels. The processing power ultimately required will depend on the sophistication of the user interface. If a front end based on artificial intelligence technology is utilized, the required processing power will be substantially increased. In any case, this is predominantly an online system and, as such, will require several times the power of a batch system (if there was an equivalent). The communications capabilities of the hardware must be sufficient to directly interface to packet switched networks employing the X.25 protocol. In addition, an efficient central processor networking capability must be provided to facilitate geographically distributed processing which is transparent to both the supplier and the user.

Access to the INSCS must be provided from terminals which follow the ANSI X.34, VT100, TTY and Telidon protocol standards. This includes personal computers equipped with appropriate terminal emulation software.

4.4 Software Platform

The core component of the Information Network software is a comprehensive interactive data base support system. A transaction processor capable of many simultaneous sessions must be associated with the data base system. The software must quickly handle searches based on multiple criteria involving both free form text and coded keys. Since the nature of searches cannot be predicted, a natural language interface is essential. The use of artificial intelligence in the user interface is a desirable future enhancement. This data base software will provide the necessary facilities for maintenance of basic data related to classification, supplier tombstone, procurement opportunities and so on. It will provide the facilities to logically connect and relate the individual data bases. Custom software development will be required for facilities such as RFP response, product promotion and software evaluation.

Personal computer software will be required for generating and accessing promotional material using graphics. Most text editors and text based communications programs will provide the necessary capabilities for text based material.

4.5 Standards

4.5.1 General System Framework

The establishment of standards for the communications, hardware and software industry is a preoccupation for the industrialized countries. The importance of standards is obviated by advances being made in communications technology that promote interconnectivity. There are many standards and there are many standards bodies. Standards are a combination of technological and political goals. The Canadian government, however, has endorsed a framework for system design and development known as the seven layer model for Open System Interconnect - (OSI Seven Layer Model). This model was conceived and is promoted internationally by the International Standards Organization - ISO.

The OSI seven layer model is like the layers of a layer cake. Each layer can be a different flavour and the flavour of any layer can be changed. The end result, however, of any such transformation still results in a layer cake being recognized by the consumer. In the INSCS, one of the layers is the communications network such as DATAPAC. If a future network could provide the same functionality as DATPAC yet work on an entirely different technology base, this "layer" of the INSCS could be replaced without the users having any knowledge of the change. It would still look and feel like the same INSCS. There could, of course, be performance differences.

4.5.2 Supplier Classification Code

Choice of a classification code for suppliers should not pose a major problem. The knowledge and experience embodied in departments such as Consumer and Corporate Affairs, DRIE, SSC and Statistics Canada should provide the required base.

4.5.3 Product and Services Classification Code

The classification scheme in Appendix B can be used initially. A review of current coding techniques can be undertaken prior to choosing the final coding method. Collaboration with departments such as SSC will be required in order to effect the necessary training of personnel. A complete descriptive manual on any coding scheme chosen will be necessary in order to promote accurate usage.

4.5.4 Communications Protocols

Communications prototcols are the rules for carrying on a conversation between computers and between computers and terminals or personal computers running terminal emulation

programs. In section 4.2, one such protocol was referred to as X.25 and another as ISDN. These sets of rules are established through a lengthy process of international discussion and negotiation. Canada is an integral part of this process. Those protocols which Canada has officially adopted should be used to the exclusion of others.

4.5.5 Presentation Protocols

Presentation protocols are responsible for the format of what is displayed on a terminal or personal computer screen. One common protocol is known as ASCII (as - ski). ASCII is the common name for the format of text data which is made up of the alphabet, the numerals and some special characters. It is the dominant protocol in the computer industry for the movement of text in electronic mail, word processing, online retrieval services, etc.

Another presentation protocol is Telidon or NAPLPS (nap-lips). This protocol, however, as well as providing for the display of text provides for the display of graphics. The catch is that the terminal that is receiving this protocol has to have special functions. A terminal that can display the ASCII protocol is not designed to display the Telidon protocol. A Telidon terminal or personal computer with appropriate software can display both. Both ASCII and Telidon conform to international standards for data transmission and are, therfore, safe to use on packet switched networks.

4.5.6 Data Security

The nature of the data to be handled by the Information Network does not present an immediate security risk for the suppliers or the users. Nevertheless, the question as to the confidentiality of responses to RFPs should be investigated. Data security should be provided where deemed necessary but use of the data security feature should be optional. Data security can be provided by encryption software. This level of protection is acceptable for low grade security applications and is economical for the suppliers.

Canada has adopted a data encryption standard developed in the US and known as ANSI - DES. DES is a mathematical technique for the scrambling of computer stored information such as that in the INSCS. The operation of DES depends on a key much the same as the PIN number used to access ATMs. The key must be known to both the user and the system. Prior to obtaining any data from the system or entering any data into the system, the key must be verified. The verification of the key is based on some random information so that verification of the key is not consistent for different access sessions. The key itself is never communicated in an unscrambled fashion. Once a user is connected and the key verified, data can be transmitted securely.

5.0 Project Plan

5.1 Overview

The INSCS consists of a number of major components. It is complex because of the number of departmental interests to be served within government, because of the diversity of uses, and because of the volatility of the information to be managed. It is not within the scope of this document to provide detailed resource and cost estimates for the implementation and ongoing support of the Information Network. Rather, budgetary figures and time frames have been suggested based on industry and government experience in developing systems which are similar in scope.

5.2 Issues and Considerations

The success of a project of this magnitude is based on a number of assumptions. The validity of these assumptions can be used to assess risk. Each assumption detailed below is accompanied with a statement regarding the extent to which it adds risk to the project outcome.

Availability of suitable data base software

The data base software required is unusual in that it must handle both textual and numeric data in searches. It must be capable of operating in an online environment and, as such, must be very efficient with respect to processing search requests. The organization of the data base must be easily changed without massive reloading. There must be a fourth generation language interface as well as one for a high level language such as "C".

There are a broad range of data base packages on the market. In general, the suppliers of these products have concentrated on a particular data base organization and have optimized the interface to this data base structure. There is a concern that the market may not offer a product which can handle all the data types required in an efficient manner. Any shortcomings, however, could be handled by custom programming if a core product with a majority of the required capabilities is located.

Determination of classification schemes

Since much of the search capability of the system will be based on supplier and product classification coding schemes, it is essential that this need be addressed fully. There are a variety of coding methodologies implemented in the federal government. Each has a specific purpose and each may be a candidate.

This will be a sensitive issue to resolve. Since it is

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fundamental to the success of the project, lack of early resolution of this issue will certainly jeopardize the project success. In fact, until a decision is reached on the classification coding issue, the balance of the project may well be delayed.

Maintenance of supplier data

Detection of births and deaths for the supplier tombstone data base is a problem which has confronted departments such as Statistics Canada and Consumer and Corporate Affairs for many years. The flux of companies in the software sector is very high. Therefore, this basic data has a tendency to deteriorate over time if update mechanisms are inadequate. Inaccuracy in this area will result in false expectations on the part of the users and will tend to reduce the usefulness and hence the usage of the system.

It is urgent that the update mechanism for supplier data be resolved early and that the project not proceed until a satisfactory approach has been established. Any given approach should be monitored throughout the project developement cycle to establish the confidence limits of the data produced.

Overall system complexity

The Information Network embodies many of the elements of modern system architectures. Based on an online environment, there are complexities introduced by communications, graphics, fourth generation languages and sophisticated programmer tools. This technical environment adds an element of risk to the project. However, the system integration resource base available in Canada with experience in such projects is extensive. Thus, the system complexity should not present undue risk to the project.

There are several major subprojects in the system. These projects can proceed in parallel in order to effect system delivery in a reasonable time frame. The project manager must be diligent in efforts to coordinate and ensure liaison between the various teams. Decisions on technical matters and project direction must be quickly and precisely communicated to all teams.

Coordination of interests

There are many interests to be served in both the economical and political arenas. Issues will arise which will require difficult and impartial decisions. The composition of the project steering committee must be such that the mandate to carry out decisions is clear and indisputable. Lack of resolution or too much compromise can tend to complicate the system design and

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introduce significant risk as a result of mandate changes after
the basic design has been established.

System Management

The system will require administrative and technical support
on an ongoing basis. Data acquistion and dissemination will be
formidable in volume even though the majority is intended to be
managed electronically. The government needs to assess whether
this function should be contracted on a facilities management
basis, maintained internally or privatized completely.

Security

Some aspects of the information are confidential. This
includes responses to RFP's and certain product data. Provision
of a comprehensive security system for access control both
physical and electronic is mandatory. Encryption of transactions
should be strongly considered.

Implementation Strategy

To avoid the complexity of implementing all components
simultaneously, a phased approach can be considered. The system
components are sufficiently well defined that a logical and
effective stepwise implementation can be achieved. Careful
consideration should be given to determine which approach would
help to ensure the successful development and implementation of
the system.

Promoting System

Success of the system is dependent on the ability of
government to promote and deliver on the system. Deliverables
from the industry's point of view are:

- access to procurement opportunities;

- promotion of company and products nationally and
  internationally by providing liberal access to the
  system;

- provision and updating of corporate information on a one
  time only basis.

5.3 Cost Estimates

The Information Network is characteristic of a medium scale system integration projects. If the system is developed using current life cycle methodologies, it would be comprised of the steps detailed in Figure 3 below. The percentage effort for each phase represents that typically experienced by DSS in conventional systems. The distribution of effort can be affected by the use of fourth generation development and prototyping tools. However, the effect on the overall accuracy of the project budget with such considerations would be negligible. It is estimated that the Functional Specification stage of the project would cost 2 – 3 million dollars. This would place the development cost at 14 – 19 million dollars. The hardware/software platform would require a mainframe with comprehensive data management and communications features. In addition, a minimum array of hardware will be required for the Canadian Software Products Assessment Centre. This combination is estimated at 2 – 3 million dollars. Operating costs for personnel and communications are expected to be in the 1.5 – 2.5 million dollar range. Communications will be a volatile component of the operating costs. Depending on the assumptions presented earlier, a prototype system should be achievable in approximately 2 years.

Project Phase	Effort %	Estimated Cost ($,000)	
Project Initiation	5	700 –	950
Functional Specification	15	2,100 –	2,850
Design and Specifications	35	4,900 –	6,650
Build and Test	25	3,500 –	4,750
Implementation	20	2,800 –	3,800
Sub total implementation		14,000 –	19,000
Hardware		2,000 –	3,000
Annual operating (3 years)		4,500 –	7,500
Total five year budget		20,500 –	29,500

Figure 3 – Project Cost Estimates and Distribution

6.0 Conclusions

The need for an Information Network for Software and Computer Services in Canada and a conceptual framework for such a system has been focused upon in this paper. It seems clear, given the estimated cost of such a system in relation to the benefits, that the INSCS system should proceed aggressively. Canadian suppliers need the infrastructure that would be provided by the Information Network to compete within Canada and abroad. The economic benefits of the system will be felt by government in its ongoing procurement and operational activities; by industry in R&D and marketing budgets; by industry in increased sales; and by the public in more effective use of tax dollars.

The impending free trade agreement will enhance the ability of foreign markets to access domestic suppliers. Currently, foreign suppliers are the dominant players in packaged software. The Information Network is an essential tool for Canadian industry to have. The online transactional nature of the system will provide instant access by the US market to Canadian products and services.

Sharing of technology and knowledge within the SCS sector is key to the survival of this important Canadian resource. All too often, unnecessary effort and precious funds are expended in redeveloping already available technology. This "Not Invented Here" posture which is common in Canadian high technology companies is a contributor to many corporate failures. The INSCS along with assistance from government funding organizations can begin to break down this barrier to progress. Shared technology means shared risk and this is a desirable objective.

In conclusion, it is recommended that a project to develop the INSCS be considered a high priority. The government should take the lead role in coordinating and sponsoring this unique and essential Canadian initiative. Response from industry will be nothing short of enthusiastic.

Appendix A - Proposed Data Elements

Supplier Tombstone Data

Name
Address

Classification Data
     Business ID Number - source to be determined
     Type   - Head Office, Sales, Branch
     Organization   - Individual, Limited, Partnership
     Province Code
     Standard Industrial Classification
     Major Activity   - hardware, software, system
                        integration, consulting

Communications
     Main Phone
     Facsimile
     Telex
     iNet
     Envoy 100
     Bulletin Board

Officers
     President
     Marketing
     Sales
     Engineering
     Administration
     Customer Support

Phone
     Marketing
     Sales
     Engineering
     Administration
     Customer Support

RMSO
     Number
     Jurisdictions

Product Data

Classification Data
- Commodity Code
- Major Function
- Minor Functions

General Data
- Date Introduced
- Latest Revision
- Number of Installations
- Distribution Channel
- References
- RMSO
- Retail Price
- Network Price
- Volume Pricing

Technical Data
- Hardware
  - Micro
    - Operating System
    - Memory Required
    - Video Card
    - Fixed disk
    - Special
  - Mini
    - Manufacturer
    - Operating System
    - Special
  - Mainframe
    - Manufacturer
    - Operating System
    - Special

Promotional Data
- Brochures
- Demonstration material
- Video
- Technical literature
- Demo site
- Online marketing data

Services Data

     Classification Data
            Commodity Code   - including specialization

     General Data
            Date Introduced
            Number of projects
            References
            RMSO
            Personnel
                    Category
                    Number

     Technical Data
            Methodologies
                    SDLC
                    PERT/CPM

            Hardware
                    Micro
                            Operating System

                    Mini
                            Manufacturer
                            Operating System

                    Mainframe
                            Manufacturer
                            Operating System

            Software
                    Data Bases - commercial brands
                    Networks   - LAN, X.25 etc
                    Other Products - SAS, SPSS etc

     Promotional Data
            Brochures
            Video
            Demo site
            Online marketing data

Software Exchange Data

        Classification Data
                Commodity Code
                Major Function
                Minor Functions

        General Data
                Date Introduced
                Latest Revision
                Number of Installations
                Development Organization
                        Contact
                        Phone
                References
                Support provided   - new releases, as is etc

        Technical Data
                Hardware
                        Micro
                                Operating System
                                Memory Required
                                Video Card
                                Fixed disk
                                Special

                        Mini
                                Manufacturer
                                Operating System
                                Special

                        Mainframe
                                Manufacturer
                                Operating System
                                Special

        Promotional Data
                Brochures
                Demonstration material
                Video
                Technical literature
                Demo site
                Online marketing data

Opportunites Data

        Classification Data
              Commodity Code   - may be several

        General Data
              SSC File Number
              Closing Date
              SSC Contact
                    Phone
                    Fax
                    Envoy 100
                    Telex
              Project Authority
                    Departmental Organization
              Requirement   - narrative
              RMSO Status   - closed or open

        Service Requirement
              General Discipline
              Specialty
              Time Frame
              Geographical location

        Software Features
              Operating System
              Data Base   - relational, tree etc
              Communications
              Accounting
              Personnel
              Graphics
              Real Time
              ....

        Technical Data
              Hardware
                    Micro
                          Operating System
                          Memory Required
                          Video Card
                          Fixed disk
                          Special

                    Mini
                          Manufacturer
                          Operating System
                          Special

                    Mainframe
                          Manufacturer
                          Operating System
                          Special

Contracts Let Data

Classification Data
    Commodity Code   — may be several

General Data
    Department
    Departmental Contact
        Phone
        Fax
        Envoy 100
        Telex
    Requirement   — narrative
    SSC File Number
    RMSO   — status
    Prime Contractor   — Supplier Id number?
        Contact
        Phone
        Fax

Service Requirement
    General Discipline
    Specialty
    Time Frame
    Geographical location
    Quantity

Software Requirement
    Commercial Product Name
    Operating System
    Data Base   — relational, tree etc
    Communications
    Accounting
    Personnel
    Graphics
    Real Time
    . . . .

Concepts Data

Classification Data
    Commodity Code   - may be several

General Data
    Sponsor
        Contact
        Phone
        Fax
        Envoy 100
        Telex
    Problem Description - narrative

Service Requirement
    General Discipline
    Specialty
    Time Frame
    Geographical location

Software Features
    Operating System
    Data Base   - relational, tree etc
    Communications
    Accounting
    Personnel
    Graphics
    Real Time
    ....

Technical Data
    Hardware
        Micro
            Operating System
            Memory Required
            Video Card
            Fixed disk
            Special

        Mini
            Manufacturer
            Operating System
            Special

        Mainframe
            Manufacturer
            Operating System
            Special

Appendix B - DRIE Classification System

DIAGRAM 3.1

COMPUTER SERVICES SECTOR

SOFTWARE PRODUCTS

- SYSTEMS/UTILITIES
- USER TOOLS
- APPLICTION SOLUTIONS

PROFESSIONAL SERVICES

- CONSULTING
  - CORPORATE
  - SYSTEMS
  - TECHNICAL
- ANALYSIS & PROGRAMMING
- TRAINING/EDUCATION
- FACILITIES MANAGEMENT
- (DATA CENTRE MANAGEMENT)
- APPLICATION MANAGEMENT
- CUSTOM SOFTWARE DEVELOPMENT

TURNKEY SYSTEMS

- SYSTEMS
  INTEGRATION
- OEM - VAR

PROCESSING SERVICES

- DATABASE
- GATEWAYS
- NETWORKS
- SHARED PROCESSING
- FACILITIES MANAGEMENT
- (DEDICATED PROCESSING)
- DATA ENTRY

PROPOSED COMPONENTS OF COMPUTER SERVICES SECTOR

* SEE DEFINITION TO DISTINGUISH

DIAGRAM 3.2

COMPUTER SERVICES SECTOR

A. SOFTWARE PRODUCTS   B. PROFESSIONAL SERVICES   C. TURNKEY SYSTEMS   D. PROCESSING SERVICES
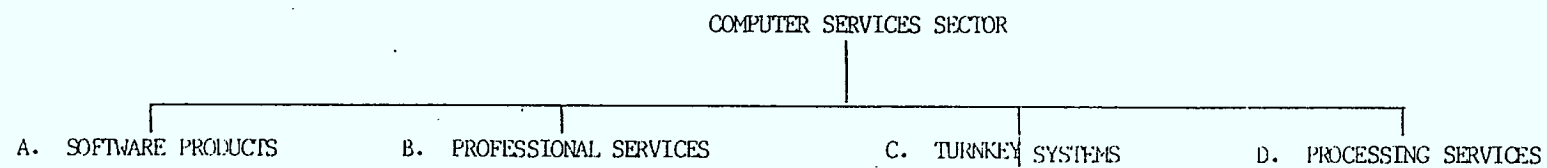
CLASSIFICATION STRUCTURE FOR COMPUTER SERVICES SECTOR

SEE CONTINUATION DIAGRAMS

DIAGRAM 3.4(A)

SOFTWARE PRODUCTS

5. TYPE OF FIRM

1. TYPE OF PRODUCT

SYSTEM PROGRAMS

USER TOOLS

APPLICATION
SOLUTIONS

2. FUNCTION/
APPLICATION

3. CLIENT
INDUSTRY

4. PROCESSING
ENVIRONMENT

2. 3. 4.

2. 3. 4.
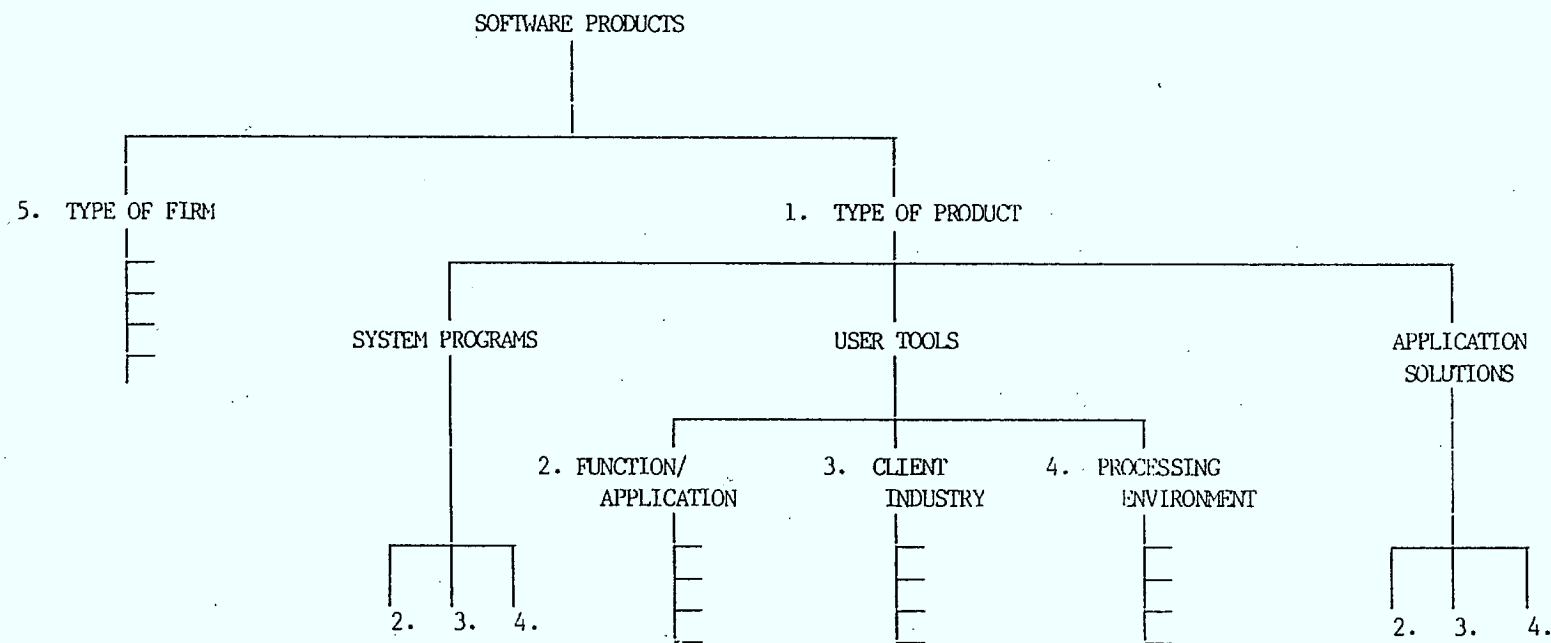
A. CLASSIFICATION STRUCTURE FOR SOFTWARE DEVELOPMENT

DIAGRAM 3.4(B)

PROFESSIONAL SERVICES

5. TYPE OF FIRM

1. TYPE OF SERVICE

CONSULTING

ANALYSIS/
PROGRAMMING

CUSTOM
SOFTWARE

TRAINING/
EDUCATION

FACILITIES/
MANAGEMENT

APPLICATION
MANAGEMENT

OTHER

2. 3. 4.   2. 3. 4.

2. 3. 4.   2. 3. 4.   2. 3. 4.   2. 3. 4.

2. FUNCTION/
   APPLICATION

3. CLIENT
   INDUSTRY

4. PROCESSING
   ENVIRONENT
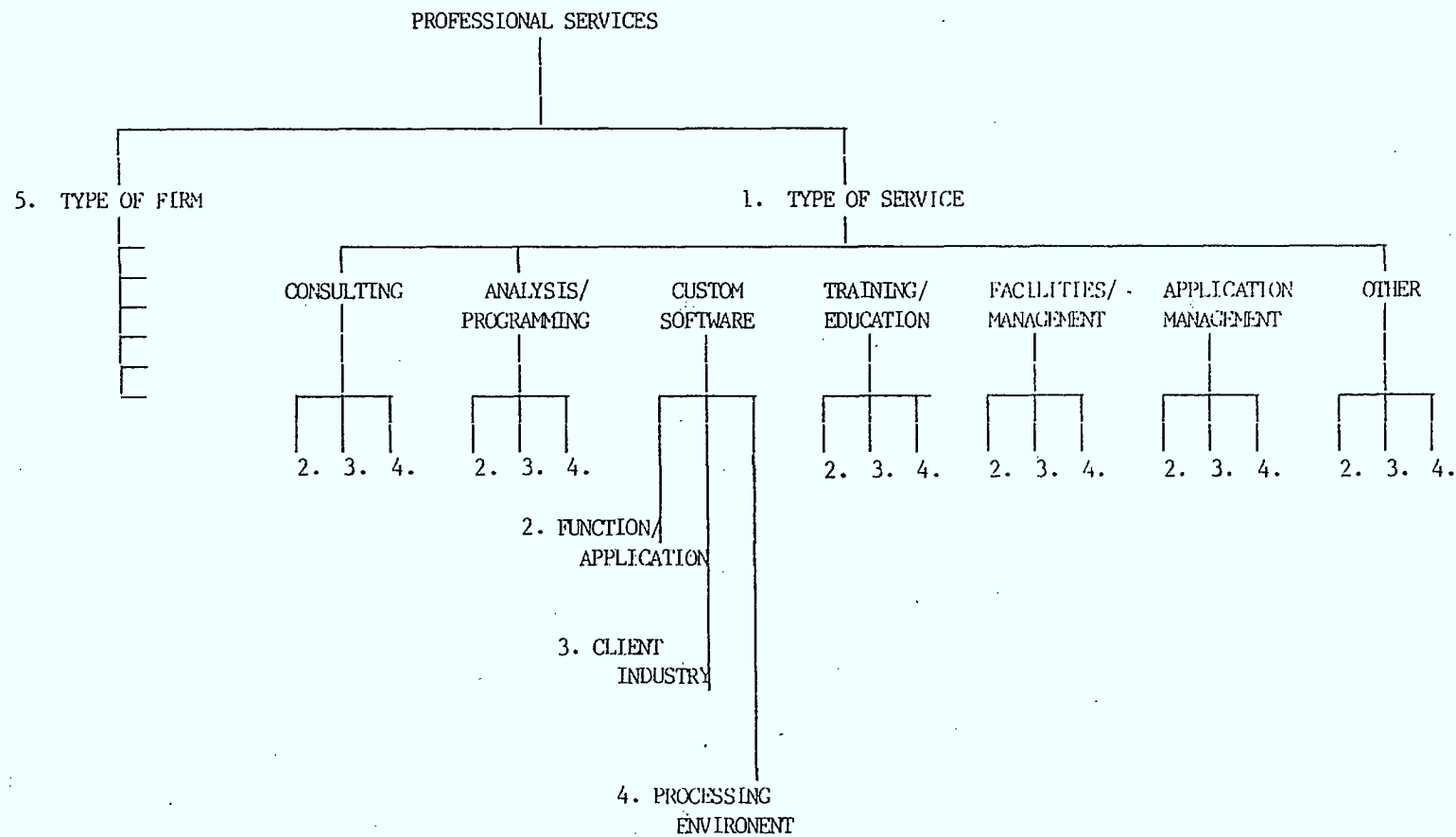
B. CLASSIFICATION STRUCTURE FOR PROFESSIONAL SERVICES

DIAGRAM 3.4(C)

TURNKEY SYSTEMS

5. TYPE OF FIRM

1. TYPE OF ACTIVITY

SYSTEMS INTEGRATION

OEM-VAR

2. FUNCTION/
APPLICATION

3. CLIENT
INDUSTRY

4. PROCESSING
ENVIRONMENT

2.

3.

4.
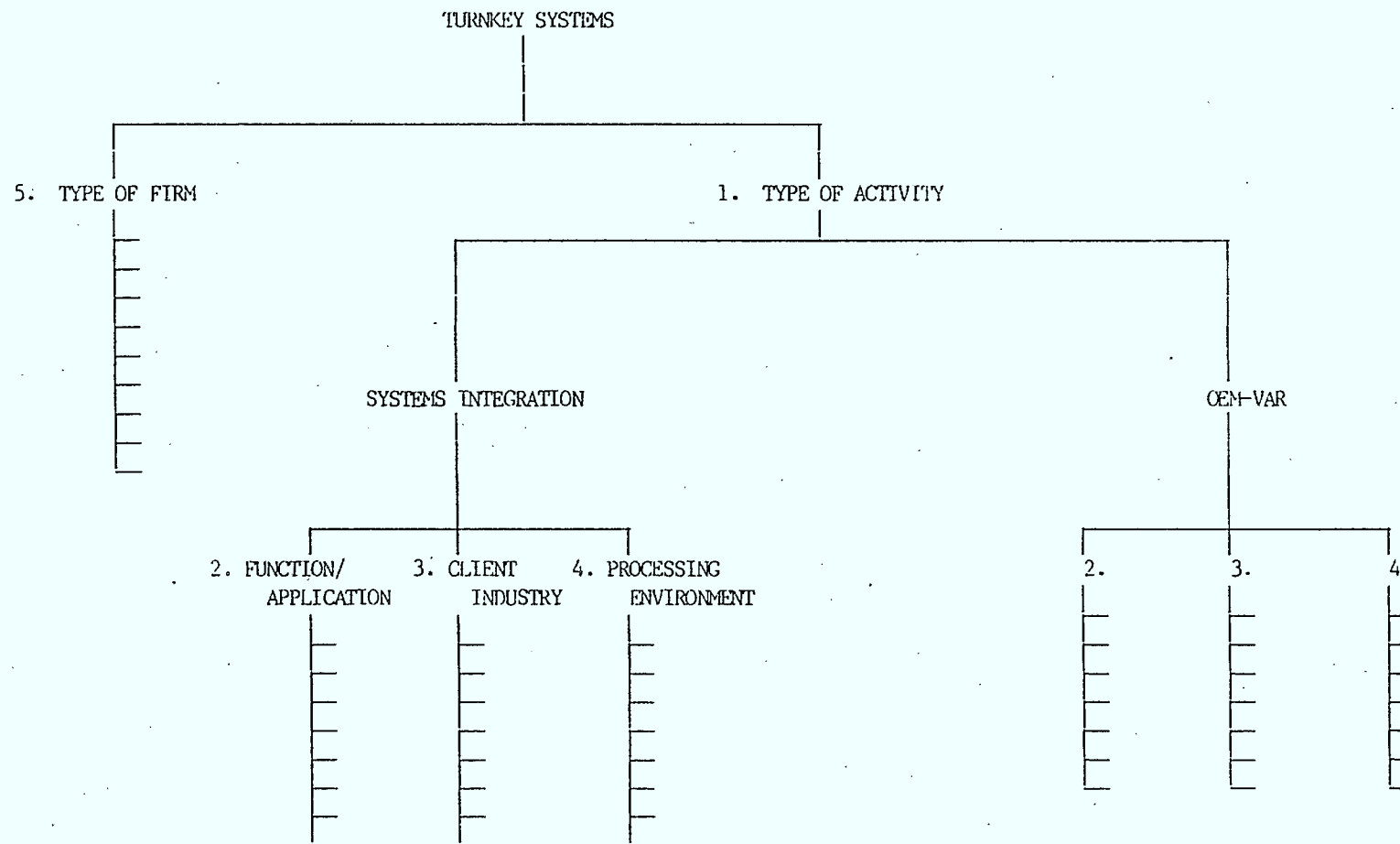
C. CLASSIFICATION STRUCTURE FOR TURNKEY SYTEMS

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DIAGRAM 3.4(D)

PROCESSING SERVICES

5. TYPE OF FIRM   TYPE OF SERVICES

DATA BASE   GATEWAYS   NETWORKS   SHARED   SHARED PROCESS-   FACILITIES   DATA
                                     PROCESSING   ING WITH   MANAGEMENT   ENTRY
                                     TO DP   APPLICATIONS
                                     DEPARTMENTS

2   2   2   2   2   2
  3   3   3   3   3   3
    4   4   4   4   4   4

2. FUNCTION/   3. CLIENT   4. PROCESSING
   APPLICATION   INDUSTRY   ENVIRONMENT

AN INFORMATION NETWORK FOR
SOFTWARE AND COMPUTER SERVICES :
CONCEPT PAPER