IMPLEMENTATION ACTION PLAN

CANADIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY

Submitted to the

Minister of State for Science and Technology

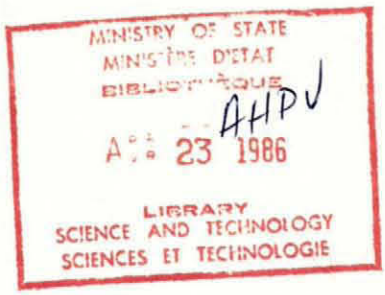
Government of Canada

by

Dr. L.M. Wedepohl, Chairman

Science Place Canada Implementation Team

December, 1985



PREFACE

Cancellation of the Institute for Manufacturing Technology program was a setback to Canada's technical communities, Canadian manufacturers and to federal-provincial relations. However, in retrospect, and as a result of the findings of the Science Place Canada Implementation Team, this situation can now be viewed in a more positive light. Cancellation of the former program has, in reality, created an exciting and challenging opportunity.

That opportunity is to enrich the scope of the activities to be based within the facility, to the increased benefit of Canadian industry. The colocation and collaborative integration of complementary resources, as detailed in this Implementation Action Plan, will result in the creation of a more balanced, responsive technical resource centre for industry. While retaining aspects of applied research and development, additional resources will be available to foster adoption of existing technology by industry and to provide training in the use of these new technologies. Improvements in productivity and international competitiveness of Canadian industry will be assured by the transformation of Science Place Canada facilities into the herein-described Canadian Institute of Industrial Technology.

ACKNOWLEDGEMENTS

The generous financial assistance of the Winnipeg Business Development Corporation in the preparation of this report is gratefully acknowledged. This support is an expression of the deep interest and concern held throughout the Winnipeg business community for the appropriate application of Science Place Canada facilities in support of Canadian industry.

We also wish to acknowledge the assistance of Tarry & Associates Ltd., Management Consultants, Winnipeg, in the preparation of this report.

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IMPLEMENTATION ACTION PLAN

CANADIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY

INTRODUCTION

In 1980, study activities were undertaken jointly by the Governments of Canada and Manitoba to investigate the need for and concepts of a national institute for manufacturing science and production technology. Consultations were held with industry, university and government sectors. Fact-finding visits were made to similar established institutes in Japan, the United States and the United Kingdom.

These investigations indicated widespread recognition of the need for improved industrial productivity in Canada and strong support for establishment of a national Institute for Manufacturing Technology to serve the needs of Canadian industry. A cornerstone of the concept was that there be strong linkages throughout Canada to end-user industries and other technical centres by way of collaborative projects and staff exchange programs. Industry would play a crucial role in ensuring that programs of the Institute related directly to industry needs.

The National Research Council became the implementing agency for the Institute. A national advisory committee, including representatives of private firms, universities and other manufacturing technology centres, was established to develop programs and to guide operations. In order to promote interaction, the Institute was designed to accommodate 125 NRC staff, 25 Manitoba Research Council staff and 25 staff from private firms and other institutes. The Institute's mandate, clearly focused on improving productivity and competitiveness, was:

- research of new or improved manufacturing processes,
- acquisition/development of technologies to improve productivity,
- promotion of adoption of new technology by industry, and
- training of workers in the use of new technology.

Construction of facilities and hiring of staff were underway when, in November, 1984, budget restraint forced cancellation of the project. Construction of the $30 million special-purpose building has continued with completion scheduled for early 1986. About $3 million worth of special equipment ordered prior to budget restraint is now on hand as well as a core group of technical staff specialists.

Recognizing the continued interests of Manitoba, industry and other parties, and given the limited alternative uses for this special-purpose building, encouragement was given to investigation of the feasibility of a broader mix of participants and programs which might properly utilize the facility to provide technical assistance to Canadian industry. To this end the Minister of State for Science and Technology appointed, in May, 1985, an Implementation Team, chaired by Dr. L.M. Wedepohl, former Dean of Applied Science of the University of British Columbia and former Dean of Engineering of the University of Manitoba. The terms of reference and membership of the Implementation Team are given in Appendices 1 and 2 respectively.

In summary, the Implementation Team was to develop an Implementation Action Plan and make recommendations concerning:

- a program for the facility,
- management and accountability mechanisms,
- a suitable legal framework,
- appropriate business and financial plans, and
- an automatic process of evaluation of the plan.

Three important goals to be considered were:

- substantial private sector involvement,
- contribution to creation and strengthening of industry, and
- financial self-sufficiency within five years.

Sixteen formal meetings of the Implementation Team were held, supplemented by numerous ad hoc working sessions and liaison activities with interested parties. The Chairman devoted his full attention to determining the interest and position of numerous potential participants in the revised Institute and to soliciting input and support from these parties.

The Implementation Team has submitted an interim report. This document constitutes their formal, final report. It is organized into three major sections, with supporting appendices, as follows:

INSTITUTE OVERVIEW - This section presents a brief discussion of the nature and importance of manufacturing technology, Canada's situation and needs, the role of the Institute in addressing these needs, the resources and programs of the intended participants and a discussion of the synergism which will occur through location of these participants within the same institute.

BUSINESS PLAN - This section presents a discussion of management and accountability structures, evaluation processes, legal framework, physical facilities, Institute program and revenues, operating expenses, financial forecasts and a time schedule for implementation.

EXECUTIVE SUMMARY - The balance of this Executive Summary follows immediately and presents a summary of findings and a succinct list of recommendations for implementation activities.

SUMMARY

The computer revolution is making a dramatic impact on industrial techniques and processes. Advanced systems such as computer aided design (CAD), computer aided manufacturing (CAM), computer integrated manufacturing (CIM) and industrial robots are being developed and applied by an increasing number of nations. Lower costs, improved quality, improved worker safety and increased competitiveness are among the social and economic benefits realized. These technologies are making an impact in many sectors such as the resource, energy and transportation industries as well as in manufacturing. Development and commercialization of advanced manufacturing systems is itself a rapid growth industry, predicted to reach annual world sales of $25 billion by 1990.

Even before the advent of robots and computer aided systems, Canada's economic performance lagged that of other industrial nations as generalized in Exhibit 1. The major causes have been low levels of R&D spending, lack of technically qualified people, slow transfer of new technology from research laboratories to industry and a general underutilization of existing technological resources that sit in isolation from one another and industry.

Canada relies on foreign suppliers for over 95% of its manufacturing technology. This points to another problem, the lack of stimulation of development and commercialization of Canadian manufacturing technologies. World leaders in the development and application of advanced manufacturing systems are noted in Exhibit 2. The growth in the use of industrial robots in these nations is indicated. In comparison, the number of industrial robots installed in Canada, in 1985, is estimated to have been 200 to 300.

Exhibit 3 indicates actions that must be taken for Canada to turn the current threat of a widening gap in manufacturing technology into a positive force for economic recovery and long term growth. Accelerated adaptation and application of existing Canadian and foreign technologies will promote near term recovery. Increased levels of R&D and more rapid movement of results from research laboratories into industry will support long term growth.

Encouragement of entrepreneurs to develop and commercialize these technologies will be required if Canada is to create the private sector infrastructure needed to support Canadian industry in the future. Educational and training programs specific to these rapidly evolving technologies will be required if industry is going to be able to assess its needs, evaluate equipment and properly select, install and utilize these complex systems.

The Institute will respond to this diversity of needs. Its mission will be:

> "to contribute to the development and growth of the Canadian economy by assisting the private sector to utilize innovative manufacturing and industrial technologies which will improve the productivity and competitiveness of Canadian industry in the near and long term".

CIIT will be unique in that it will strongly emphasize the provision of R&D to the private sector. To ensure this, the majority of Management Board members will be from the private sector.

EXHIBIT 1
CANADA'S SITUATION RELATIVE TO OTHER INDUSTRIAL NATIONS

. low spending on research and development
. shortage of qualified technical persons
. decline in industrial productivity
. decline in competitiveness of resource industries
. trade deficit in value-added goods
. decline in per capita income
. decline in standard of living
. high levels of unemployment
. false security of a devalued dollar
. decreased technological and innovative capabilities
. shortfall in the application of technology in industry
. slow dissemination of technology in industry
. demise of some technology-based industries
. barriers to adoption of new technologies
. high dependence on foreign suppliers of technology

EXHIBIT 2
COMPARISON OF THE APPPLICATION OF INDUSTRIAL ROBOTS

COUNTRY	NUMBER OF INDUSTRIAL ROBOTS	
	1982	1984
Japan	6,000	64,600
United States	3,500	13,000
West Germany	1,133	6,600
France	-	3,380
Italy	400	2,700
United Kingdom	371	2,623
Sweden	1,200	2,400
Belgium	-	860
Spain	200	516
Total	12,804	96,697

Source: British Robot Association

EXHIBIT 3
ACTIONS NEEDED TO PROMOTE ECONOMIC RECOVERY AND GROWTH

. accelerate application of existing technology
. apply to manufacturing, resource and other sectors
. supply a spectrum of resources to address broad needs
. increase industrial relevance of public R&D
. strengthen regional technological resources
. promote industry/university/government collaboration
. avoid duplication and fragmentation of resources
. train professionals and industrial workers
. improve management of technology
. support domestic manufacturing technology firms.

To accomplish this mission CIIT will draw together a group of complementary participants as noted in Exhibit 4.

National Research Council (NRC) will locate its Robotics and Automation Section in CIIT. Cooperative applied R&D projects will be conducted, using teams of NRC, MRC/ITC, university and industry guest workers, in such areas as robotics, computer integrated manufacturing and flexible manufacturing systems. Early projects will include application of other NRC projects to Manitoba industry. Two industrial firms are now planning projects with CIIT.

Manitoba Research Council (MRC) will relocate portions of its Industrial Technology Centre (ITC) and perhaps the MRC Directorate Office. MRC/ITC will provide shorter term R&D, technical services and training. Past projects have involved product and manufacturing process development for industry. ITC is about 60% self-sufficient with fee revenues of $2.5 million in 1985. MRC/ITC will manage the workshop, library and reception area for CIIT.

The Private Sector will participate in many ways. Space has been set aside for firms to collaborate with CIIT on fee-for-service R&D projects, gaining access to the unique resources of the Institute. Firms who cannot afford their own systems will time-share on CIIT equipment, for a fee. Education and training courses will be offered, paid for by fees. Technology transfer programs will be offered including seminars, conferences, and workshops. CIIT will first establish its resources and reputation which will then lead to full industrial participation. Local firms are very supportive of CIIT.

Two educational institutions will be represented at CIIT. The University of Manitoba will provide liaison with the research resources located at its campuses and will promote commercialization of university research. U of M staff will conduct educational programs and R&D projects on site at CIIT and in collaboration with other CIIT participants. Red River Community College will utilize CIIT's advanced equipment to train industrial workers. They will use CIIT facilities to develop and deliver special courses. Linkages will occur with other colleges and universities. Several universities have indicated a strong desire to collaborate with CIIT.

The Industrial Applications of Microelectronics Centre will relocate its staff of 23 persons. IAMC will conduct R&D for industry clients and offer courses in microelectronics applications. Courses have been highly praised by industry. IAMC will collaborate on R&D projects and training activities. TIEM Canada, a private company involved in training of entrepreneurs, will locate computer-based training facilities in CIIT. Emerging new industrial entrepreneurs and companies will have access to management training as well as a full range of technical support services from other CIIT participants.

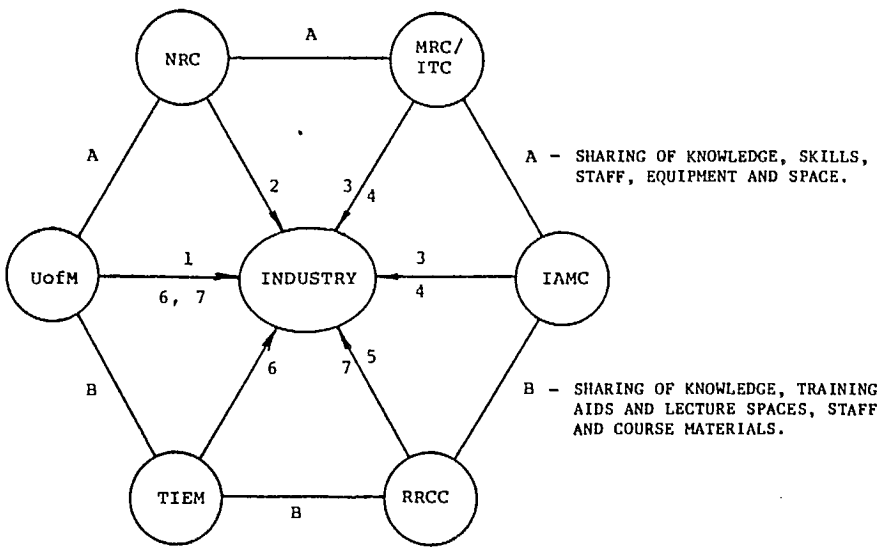
Synergism will be achieved through sharing of knowledge, technical skills, R&D staff, advanced equipment and space. Industry will benefit from the colocation of this array of needed resources and the economy of their integration. Synergistic effects and benefits are illustrated in Exhibit 5. CIIT will be directly responsive to the desire of government, as expressed in New Management Initiatives, May, 1985, to take integrated approaches to R&D, to consolidate, rationalize and reduce duplication and fragmentation of resources, to create self-sufficient centres, to improve industry access to technology and by so doing, enhance the competitiveness of Canadian industry.

EXHIBIT 4
PARTICIPANTS IN CIIT

	ROLE	STAFF	(constant 1985 $ millions) START-UP BUDGET	OPERATING BUDGET
NRC	Longer term strategic and tactical applied R&D	50	$7.3	$6.4
MRC/ITC	Shorter term R&D, technical services, training	65	n/a	n/a
INDUSTRY	Cooperative R&D, fee for services, training, etc.	per project	tbd	tbd
U of M	Basic and cooperative R&D, education	8	n/a	n/a
RRCC	Training	6	n/a	n/a
IAMC	Cooperative R&D, training	23	tbd	tbd
TIEM	Entrepreneurship training	tbd	tbd	tbd

n/a not available, subject to release by the Government of Manitoba
tbd to be determined

EXHIBIT 5
INTERNAL SYNERGISM AND BENEFITS TO INDUSTRY



INDUSTRY BENEFITS:

1. BASIC RESEARCH SUPPORT
2. APPLIED RESEARCH SUPPORT
3. DEVELOPMENT ASSISTANCE
4. APPLICATIONS ASSISTANCE
5. TECHNICAL TRAINING
6. MANAGERIAL TRAINING
7. HIRING POOL OF TECHNICALLY QUALIFIED PEOPLE

The Institute will occupy the former Science Place Canada building. This $30 million special purpose facility is nearing completion and will soon be ready for occupancy. CIIT will be a federally-incorporated, non-profit corporation with a Management Board composed of private sector members, senior executives of participant parent organizations and representatives of other technical bodies across Canada. At the appropriate time ownership of the building will be transferred to CIIT. Exhibit 6 illustrates the organization structure. Participants will retain their existing reporting lines to their parent organizations and will continue established business and financial practices relative to their clients. They will enter into an occupancy contract with the building owner and will retain title to their equipment placed in CIIT.

The Management Board will ensure relevance of CIIT programs and resources to industry needs, will promote uptake of CIIT programs by industry nationally and will promote external linkages of CIIT to other technical centres. It will accomplish these tasks by directing the affairs of the Executive Office and through the actions of board members within the organizations they control and influence. Management Board's influence on participants will be via the Executive Office but also through the direct authority of the executive of the parent of each participant as represented on the Management Board.

The Executive Office will promote CIIT on a national basis, develop proactive technology transfer programs, ensure internal synergism and oversee operation of the building. Executive Office influence on participants will be via persuasion and negotiation and, as necessary, through the direct line of authority provided by members of the Management Board.

The Internal Program Committee will consist of the resident director of each participant and will coordinate the use of facilities, stimulate and coordinate cooperative R&D projects and promote synergism amongst participants.

Annual and long range plans will be drawn up by the Executive Office and Internal Program Committee which will reflect actions to achieve CIIT's mission. Annual reports will document progress. These will be public documents. An external evaluation will be conducted every three years.

There will be two distinct budgets, Building Operations and Executive Office. Participants will share, pro rata their space, in building operating expenses. Participants will not contribute to the Executive Office budget. Executive Office expenses will be met by revenues earned by the office in attracting cooperative projects to CIIT. Revenues will be generated through "Institute Fees" applied as part of the cost, to industry, to access and use the resources of CIIT. Technology transfer programs will also generate revenues.

Exhibit 7 presents financial pro formas. Building expense recoveries will increase as participants occupy space. In order to achieve its mission and be self-sufficient within five years, CIIT will employ an Executive Director of exceptional skills and influence. Appropriate managerial and program budgets have been estimated and must be sustained during the start-up and growth phases. Through the actions of the Executive Office to stimulate industry participation, CIIT will become self-sufficient within five years. Exhibit 8 summarizes the forecast start-up deficit which, over four years, will total $2 million.

EXHIBIT 6
CIIT ORGANIZATION CHART

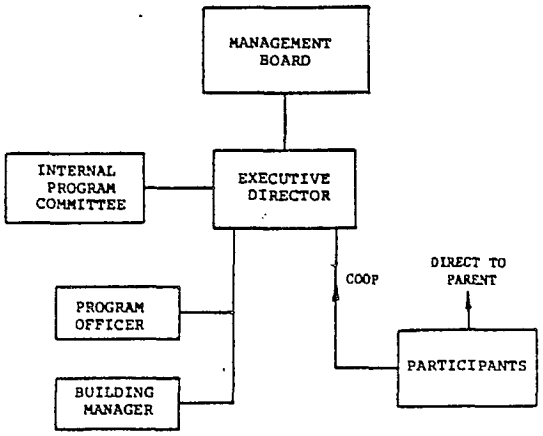


EXHIBIT 7
FINANCIAL PRO FORMAS
(constant 1985 $-000's)

Year	1	2	3	4	5
Building Operations:					
Revenues	885	1,125	1,180	1,190	1,200
Expenses	1,200	1,200	1,200	1,200	1,200
Surplus(Deficit)	(315)	(75)	(20)	(10)	0
Executive Office:					
Revenues	0	170	250	390	560
Expenses	400	500	500	550	550
Surplus(Deficit)	(400)	(330)	(250)	(160)	10

EXHIBIT 8
PROJECTED START-UP DEFICIT
(constant 1985 $-000's)

Year	1	2	3	4	Total
Building Operation	315	75	20	10	
Executive Office	400	330	250	160	
Contingency (30%)	210	110	70	50	
Start-up Deficit	925	515	340	220	2,000

RECOMMENDATIONS

The recommendations of the Implementation Team are that:

1. The Government of Canada and the Government of Manitoba enter into negotiations to work towards commitment to establish the Canadian Institute of Industrial Technology as described in this Implementation Action Plan.

2. The Government of Canada provide to the National Research Council the incremental start-up and annual operating funds necessary to undertake its role in CIIT, as described herein.

3. The Government of Canada negotiate with the Government of Manitoba to secure incremental provincial funding for the three provincial agencies that will participate in CIIT; namely, The Manitoba Research Council, The University of Manitoba and Red River Community College.

4. The Government of Canada and the Government of Manitoba review the financial status of the Industrial Applications of Microelectronics Centre, Inc. to the end of helping to arrange any necessary incremental funding to allow IAMC to assume its role in CIIT.

5. The Government of Canada and the Government of Manitoba agree to share equally in the start-up deficit funding of CIIT, estimated at a total of $2 million over the first four years of operation.

Once these commitments are in place, it is recommended that:

6. An interim Federal-Provincial management committee be set up to attend to the affairs of CIIT in the start-up stages prior to appointment of the Management Board and the Executive Director.

7. The Interim Committee:

   - Arrange for the incorporation of CIIT as described below.
   - Establish banking arrangements for CIIT.
   - Assist in establishing occupancy contracts between NRC, the interim owner of the building and participants, these contracts to be for a term of five years.
   - Hire a Building Manager.

- Strike a selection committee to establish criteria and a search process for an Executive Director.

- Start to assemble a list of candidates for Management Board appointments.

8. NRC retain ownership of the building in the near term and that ownership be transferred to CIIT once the Management Board and Executive Office are established to the point where they can assume the responsibilities of ownership.

9. The person appointed Executive Director be a dynamic industry leader, well recognized and regarded by industry across Canada, capable of providing the vision and leadership required for CIIT to succeed.

10. CIIT be federally incorporated as a non-profit organization.

11. The Management Board of CIIT be made up of a majority of members from the private sector with the Chair a private sector member and the Executive Director the Board Secretary.

12. The Management Board be made up of three categories of members as follows:

a) Parents of Public Sector Participants:

- President, National Research Council
- Executive Director, Manitoba Research Council
- President of The University of Manitoba
- President of Red River Community College

b) National Umbrella Organizations:

- President, Canadian Manufacturers Association
- President, Association of Provincial Research Organizations of Canada

c) Private Sector Organizations:

- Chairman of the Board, IAMC Inc.

- President, TIEM Canada Inc.
- plus the senior officer of at least five private companies.

13. Representation from private sector firms take into account geographic representation, industry sector representation, and include firms active in the commercialization of advanced manufacturing technologies as well as end-user industries.

14. The Management Board be a working board and appropriate subcommittee structures be established to lend support to the activities of the Executive Office.

15. The Management Board, Executive Office and each participant work together to create a harmonious environment and the facilities to allow the Institute to realize its full creative and innovative potential.

16. This Implementation Action Plan be released as a public document and circulated to industry to inform companies as to the mission and resources of CIIT and the role the Institute can play, as a partner with the private sector, in the strengthening of existing industries and the creation of new Canadian industries.

INSTITUTE OVERVIEW

IMPLEMENTATION ACTION PLAN

CANADIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY

ECONOMIC IMPORTANCE OF MANUFACTURING TECHNOLOGIES

Manufacturing technologies can be defined as those techniques and equipment used in various stages of manufacturing ranging from product design, characterization and testing of raw materials, conversion and forming of materials, assembly and testing of products through to inventory and management control systems. In the pre-computer era, manufacturing technologies evolved slowly. While advances were made in automation of machine tools and testing equipment, many skilled and semi-skilled workers were still required in design and testing of products, movement of materials in and out of work stations and in the operation of manufacturing equipment. Manufacturing processes were largely "hands on".

In the last decade the computer revolution has caught up with this situation. The declining cost of computer hardware and software and increased sophistication and capacities of these systems have given rise to development and application of "computer aided" adjuncts to traditional manufacturing processes - computer aided design (CAD), computer aided manufacturing (CAM), computer aided process planning (CAPP), etc. At the same time, advances in sensory systems (visual and tactile) and mechanical control systems have allowed technology to "close the loop", giving rise to robot work stations and automated materials handling systems that, once programmed, can work largely unattended in a "hands off" mode.

Exhibit 9 notes the applications and economic advantages of a number of established and evolving advanced manufacturing technologies. Exhibit 10 indicates some of the economic issues concerning the adoption of these technologies. Positive benefit to cost results are being realized by manufacturers throughout the world. Early users have been large, technology-based firms in the automotive, aerospace and electronics industries who have the volumes, capital and technical resources to apply these technologies economically.

Recognizing that these latter factors present barriers to smaller firms, many countries have established national resources to allow smaller manufacturers to share costs and become more competitive through adoption of these technologies. Of prime importance is the evolving area of flexible manufacturing systems which allows production lines to be converted quickly to handle a variety of products. Such systems reduce the size of the economic production run and allow firms to be more competitive in smaller markets.

Finally, while the application of these technologies will result in economic benefits to almost all manufacturing sectors, the provision of these services and equipment itself constitutes a dynamic, international growth industry predicted to reach $25 billion per annum by 1990. At this time, the leading nations in both development and application of advanced manufacturing technologies are Japan, West Germany, Sweden and the United States. Emerging industrial nations such as Korea are "leap frogging" from traditional to advanced manufacturing methods, as an important part of their industrial strategies to sustain economic activities and growth.

EXHIBIT 9
EXAMPLES OF ADVANCED MANUFACTURING TECHNOLOGIES

TECHNOLOGY	APPLICATIONS	ECONOMIC/SOCIAL BENEFITS
Computer Aided Design (CAD)	Design of products, structures, buildings. Simulated testing and stressing of same.	Reduced design time and cost; better products; better use of resources.
Computer Aided Manufacturing (CAM)	Applicable to some degree in virtually all manufacturing industries.	Reduced costs and wastes; improved quality and utilization of facilities.
Computer Integrated Manufacturing (CIM)	Management of the total cycle from design to shipment of products.	Improved response times and corporate efficiency; proper control of complex processes.
Automated Inspection and Testing	Exhaustive and accurate testing of complex products.	Safer, more reliable products; lower costs.
Robotics	Repetitive and hazardous tasks.	Worker safety; lower costs; better quality.
Flexible Manufacturing	Multi-product and job shop manufacturing.	Economic small order runs; better facility utilization; access to small markets.

EXHIBIT 10
ECONOMIC ISSUES CONCERNING ADVANCED MANUFACTURING TECHNOLOGIES

Economic Benefits of Adopting Technologies:
Maintain or improve productivity and competitive stance; maintain or improve market access and export of value-added products; upgrade and maintain employment.

Economic Consequences of Not Adopting Technologies:
Decline in competitiveness in domestic and international markets, particularly for smaller firms; decline and exit of traditionally-based industries; increased unemployment; increased economic dependence on non-manufacturing sectors; "brain drain" of highly qualified people.

Barriers to and Costs of Adopting Technologies:
High initial costs and risks, particularly for smaller firms; need for a coordinated multi-disciplinary approach; need to speed up the transfer of technology; need for technically trained workers.

CANADA'S SITUATION AND NEEDS

Even before the advent of the computer revolution and advanced manufacturing technologies, Canada's economic performance lagged that of many other nations. Exhibit 11 summarizes salient features of the Canadian economy in the last few decades relative to other industrial nations. Declining performance in Canadian resource industries and Canada's inability to keep up with other nations in technology-driven growth has resulted in a relative decline in the standard of living of Canadians (temporarily held up by mounting government deficits) and high levels of unemployment and under-employment. The recession of the early 1980's served to exaggerate these trends. The Canadian resource and manufacturing sectors face three issues:

- long term general decline in productivity and competitiveness,
- the impact of the 1980's recession, and
- the threat of an ever-increasing technology gap (see Exhibit 12).

In the opinion of many, research and development and, in particular, the rapid deployment of existing modern technologies by industry, will be key factors in halting negative long term trends and encouraging the recovery of the Canadian economy. Fundamental issues which must be addressed are:

- the inability of industry to fund risky, longer term R&D,
- more effective use of technology resources that sit in isolation,
- removal of barriers of access to technology by smaller firms, and
- support of entrepreneurs to commercialize Canadian technology.

Canada now imports close to 95 percent of its requirements in manufacturing technology. Nevertheless, there must be Canadian resources active in the development and application of these technologies if Canada is to have the skills to understand, select and apply foreign technology and to maintain a bargaining position in international trade in these technologies.

Much is being done to address these structural issues and needs in the ways noted in Exhibit 13. There are 77 Canadian organizations (54 university or college based) which address, to a degree, one or more of the many facets of manufacturing technology. However, the question is not only that of sufficiency in numbers, but of location and breadth of resources. Many organizations have only nominal resources devoted to manufacturing technology. Many are narrowly focused and isolated from industry. In establishing policy as to the number and nature of resource centres there is much more danger, with drastic long term implications, in erring on the side of too few resources.

The Institute will create an economic stimulus particularly to Western Canada and will provide a vital uplift to enhance the competitiveness of industry. Winnipeg's diverse manufacturing sector, representing 18 of the 20 industry groups, mirrors the Canadian economy and will provide a living laboratory for technological innovation in medium and smaller sized firms. CIIT will address the deficiency of R&D capacity within smaller firms. It will reinforce other technology initiatives, help develop a critical mass of regional scientific and technical expertise and enhance education and training programs. CIIT's presence in Winnipeg's Core Area will be a strong signal to private investors that Winnipeg has a vibrant future.

EXHIBIT 11
CANADA'S SITUATION RELATIVE TO OTHER INDUSTRIAL NATIONS

- low spending on research and development
- shortage of qualified technical persons
- decline in industrial productivity
- decline in competitiveness of resource industries
- trade deficit in value-added goods
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- high levels of unemployment
- false security of a devalued dollar
- decreased technological and innovative capabilities
- shortfall in the application of technology in industry
- slow dissemination of technology in industry
- demise of some technology-based industries
- barriers to adoption of new technologies
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COMPARISON OF THE APPPLICATION OF INDUSTRIAL ROBOTS

COUNTRY	NUMBER OF INDUSTRIAL ROBOTS	
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Spain	200	516
Total	12,804	96,697

Source: British Robot Association

EXHIBIT 13
ACTIONS NEEDED TO PROMOTE ECONOMIC RECOVERY AND GROWTH

- accelerate application of existing technology
- apply to manufacturing, resource and other sectors
- supply a spectrum of resources to address broad needs
- increase industrial relevance of public R&D
- strengthen regional technological resources
  promote industry/university/government collaboration
- avoid duplication and fragmentation of resources
- train professionals and industrial workers
- improve management of technology
- support domestic manufacturing technology firms.

MISSION AND CONCEPT OF THE INSTITUTE

The mission of the Canadian Institute of Industrial Technology will be:

> **"to contribute to the development and growth of the Canadian economy by assisting the private sector to utilize innovative manufacturing and industrial technologies which will improve the productivity and competitiveness of Canadian industry in the near and long term".**

The Institute will be unique in that it will strongly emphasize the provision of R&D services to the private sector. To ensure this, the majority of the members of the Management Board will be from the private sector. Over time, CIIT will grow in stature and reputation and will become internationally recognized as a centre for advanced manufacturing and industrial technologies.

The key words of this mission statement provide a framework for the concept of the Institute:

contribute	The programs of the Institute are necessary to but not sufficient for economic recovery and growth.
growth	Growth will occur in established industries through the application of appropriate technologies and the enlistment of highly qualified persons. Growth will also occur through fostering the commercialization of Canadian technology, not only for domestic and export sale but to help ensure the evolution of a manufacturing technology infrastructure in Canada.
assisting	The Institute's role will be to facilitate the decisions and actions of the private sector. Industry needs will guide the development and programs of the Institute.
private sector	Interaction with and use of the Institute by private firms will be central to the activities of the Institute. The Institute will be a resource centre for both the physical and human resource needs of industry.
utilize	The process of adoption of technology by industry is complex and multi-faceted. It ranges from awareness and evaluation to implementation and proper utilization. In some instances firms cannot afford dedicated resources and prefer to purchase services on an as-needed basis. A flexible multi-service, interdisciplinary approach will be required in order for the Institute to achieve its mandate.

innovative technologies	The Institute will exist not for the sake of technology but for the economic and timely improvement of industry through the use of existing, emerging or new, innovative technologies, be these of Canadian or foreign origins. The mandate of the Institute will be help move these innovative technologies from laboratories into the workplace.
productivity	Productivity of industrial capital as well as labour must be addressed. The Institute must understand and appreciate the capital investment criteria of industry.
competitiveness	Competitiveness goes beyond price. Technologies which address other elements of the marketing mix (design, quality, timely delivery, etc.) must be considered.
Canadian industry	The Institute will have a national scope and will serve companies, large and small, not only from the manufacturing sector but from other sectors that can benefit from these technologies, such as the resource, transport and energy sectors. Furthermore, needs unique to Canadian industry such as the question of economic adoption of advanced technologies by Canada's many smaller firms must be addressed. By virtue of its location, the Institute will serve, at first hand, the needs of industries located in Manitoba and Western Canada.
near and long term	Sustained economic development and growth requires sustained technology support. Technologies evolve at rapid rates. The Institute must focus on near term industry adoption of proven and emerging technologies but must also study, adapt and contribute to the creation and development of those new, innovative technologies which will be relevant to industry in the years to come.

ACTIVITIES AND RESOURCES OF THE INSTITUTE

To achieve its mission the Institute must first address the barriers that impede the use of new manufacturing technologies by industry. Barriers exist at each of the five main stages of the technology adoption process illustrated in Exhibit 14. Usually, the smaller the firm the more numerous and larger the barriers. Examples of the activities to be carried out by the Institute to lower barriers are noted.

In order to foster Canada's own infrastructure the Institute will:

- develop new Canadian technologies worthy of commercialization,
- identify, evaluate and adapt appropriate foreign technologies,
- collaborate with established suppliers to help finalize development and commercialization of these technologies, and
- provide incubation space and entrepreneurial support services to smaller Canadian firms wishing to commercialize new technologies.

In regard to ongoing operational assistance to industry, the Institute will provide, for a fee, a wide range of technical consulting services and shared access to advanced computer and manufacturing equipment.

In essence, industry needs economic, ready access to five resources:

- information
- equipment
- technical skills
- education/training resources
- commercialization support resources

The notion of the Canadian Institute of Industrial Technology (CIIT) is to capitalize on the opportunity afforded by the cancellation of the Institute for Manufacturing Technology program and to locate, in Science Place Canada, selected complementary components of technical and educational organizations that can together provide these five necessary resources. A high degree of synergism and efficiency in relating to industry will be achieved. CIIT collaboration with other resource centres in Canada will augment on-site resources. The following organizations will locate selected portions of their operations in the Institute:

- National Research Council (NRC)
- Manitoba Research Council (MRC)
- University of Manitoba (U of M)
- Red River Community College (RRCC)
- Industrial Applications of Microelectronics Centre (IAMC)
- TIEM Canada Ltd. (TIEM)

Industry will, on occasion, locate staff and other resources in the Institute, on a project-specific basis, to conduct collaborative projects with the staff of CIIT. In the future, other participants in addition to those noted above may reside in the Institute. The types of resources to be provided by participants are noted in Exhibit 15 which also provides a first illustration of synergism.

EXHIBIT 14
ACTIVITIES TO LOWER BARRIERS TO ADOPTION OF TECHNOLOGY

STAGE OF ACCEPTANCE	SAMPLE ACTIVITIES
Awareness:	educational courses, staff exchange programs, seminars, workshops, technical information services, demonstrations, missions, selective applied research and development.
Evaluation:	technical information services, technical and economic feasibility studies, field trips, demonstrations, pilot programs, selective research and development.
Adaptation:	technical information services, technical studies, acquisition of foriegn technologies, selective research and development programs, pilot programs, training courses.
Implementation:	technical consulting, commissioning and testing services, training courses.
Utilization:	technical consulting, training courses, operating and maintenance assistance.

EXHIBIT 15
INSTITUTE PARTICIPANTS AND THEIR MAJOR RESOURCE CONTRIBUTIONS

	NRC	MRC	INDUSTRY	UofM	RRCC	IAMC	TIEM
Technical Information	X	X	X	X	X	X	
Equipment	X	X	X	X		X	X
Technical Skills	X	X	X	X		X	
Education/Training		X		X	X	X	X
Commercialization Support		X	X	X			X

THE ROLE OF THE NATIONAL RESEARCH COUNCIL

NRC will establish in the Institute the Robotics and Automation Section (RAS), one of the four components of its national Laboratory for Intelligent Systems. RAS will occupy one floor of the building and reach a staff of 50 within a few years. It will conduct applied research and development in sensor-based robotics, computer integrated manufacturing, computer integrated production and flexible manufacturing systems. Staff will carry out industry-related projects and conduct longer term collaborative projects with other NRC labs and guest workers from industry and universities. NRC's IRAP Field Office will operate out of CIIT under its current working relationship with the Manitoba Research Council.

NRC's participation in CIIT will strongly support the mandate of NRC as expressed in its new five year plan. Specifically, there will be improved industrial relevance of research, a much stronger regional presence of NRC and research programs in important generic technologies will be carried out. NRC's participation will also strongly support the CIIT mission. NRC resources will focus on the medium term aspects of the mission and provide highly specialized technical knowledge and equipment resources not available elsewhere in Canada. NRC presence is mandatory for the success of CIIT.

RAS will conduct two types of projects - strategic and tactical. Strategic projects are longer term, lasting up to five years. They may originate within NRC but have clear future applications and clients in mind. Tactical projects are shorter term (perhaps two years in duration) and involve an industrial client wishing to solve a specific problem. When fully staffed RAS will be conducting four or five strategic projects and 15 to 20 tactical projects at any given time. These will be selected so as to serve the needs of local, regional and national firms in a balanced manner.

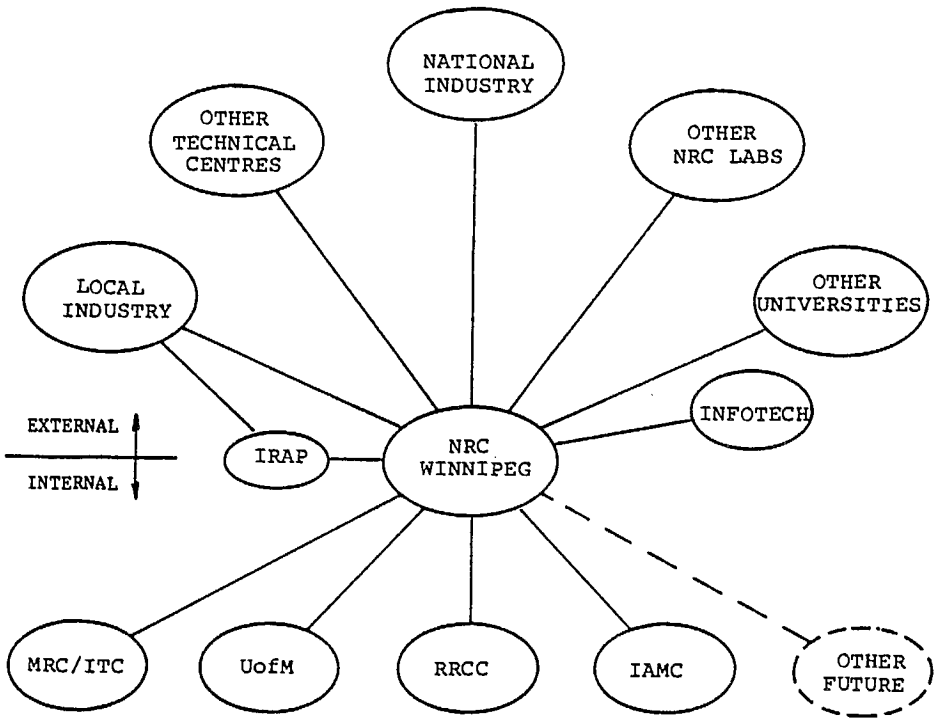
Much of the work now going on in the Ottawa portions of the Laboratory for Intelligent Systems will be immediately and directly complementary to the applied industrial projects to be carried out in Winnipeg. By drawing on related work in Ottawa, the NRC Winnipeg group can build strong R&D programs quickly. Three examples of such linkages are as follows:

> Scheduling And Control System NRC Ottawa has developed a generic solution to manufacturing scheduling and modelling for smaller-sized firms. Winnipeg NRC staff will now work to adapt and apply the system to several local industries, notably Manitoba's sizable garment industry.
>
> Intelligent Welding Cell NRC staff in Quebec are developing an automatic welding cell. NRC Winnipeg staff will work to adapt the system to production lines of Manitoba implement manufacturers.

Flexible Manufacturing Cell Several Winnipeg manufacturers have installed both CAD/CAM systems and numerically controlled machine tools and are now ready to consider the next step up in technology to an integrated, multi-machine flexible manufacturing cell. An early client is likely to be Bristol Aerospace. Pratt & Whitney's new Dartmouth, Nova Scotia facility could also benefit from this program.

NRC Winnipeg staff will largely devote their time to NRC projects but will also devote effort to supporting the projects and "common causes" of other CIIT participants. Also, NRC will require substantial support from other NRC staff and guest workers from industry and university. Not only will these resources be needed to enable the planned number of projects to proceed but the skills and abilities of these outside experts will be needed for projects to succeed. Exhibit 16 illustrates a number of the supporting linkages that will occur between NRC's Winnipeg section, both internally and externally to CIIT.

EXHIBIT 16
INTERNAL AND EXTERNAL LINKAGES TO NRC'S WINNIPEG SECTION



NRC will retain interim ownership of the Science Place Canada building. CIIT will be incorporated as a non-profit organization and once the Institute's organization and management structures are established to the satisfaction of all, ownership will be transferred to the Institute.

NRC will occupy the entire fourth floor of the building, consisting of 34 offices and 24 laboratories, plus one-half of the space in the library and one-third of the space in the workshop. These areas total about 2100 square meters or 34% of building space exclusive of common areas. NRC will not man the workshop area but will locate equipment in the shop for use on projects on an as-needed basis.

Three cost elements must be met by NRC to support its activities in CIIT:

- one-time start-up costs,
- basic annual operating costs, and
- incremental annual operating costs

Start-up costs relate mainly to equipment. Special-purpose equipment purchased to date is summarized in Exhibit 17 together with budget estimates for equipment still needed to properly complete the areas of the building of concern to NRC. Equipment already purchased is on temporary loan to MRC, U of M and IAMC and is in productive use. If CIIT does not go ahead, these organizations will lose access to this equipment when it is relocated by NRC. Transfer of MRC machine shop equipment to CIIT could reduce NRC's requirement in this category. Other start-up costs include $0.5 million for equipment relocation and $0.7 million for staff relocation.

Basic annual operating costs are the amounts which would be required to support a staff of this size undertaking these kinds of activities within NRC's Ottawa laboratories. Annual costs incremental to these basic costs will be incurred due to three factors: lack of shared access to equipment in the Ottawa laboratory, additional operating expenses due to geographic location and NRC's share of the annual operating expenses of the CIIT building.

NRC Winnipeg staff now consists of six positions (excluding IRAP staff). The estimated complement at full staff is shown in Exhibit 18. A portion of the new professional hires and all of the other new hires can likely be supplied by Manitoban and Western Canadian graduates. Experts in advanced manufacturing systems are in short supply worldwide. NRC will need time to build expertise within this group and it will be critical that experienced university staff secondments be made to strengthen the group in its early years.

Exhibit 19 presents a summary of staff and R&D project activity build-up and budget requirements. Budgets are in constant 1985 dollars.

EXHIBIT 17
NRC EQUIPMENT ON HAND AND REQUIRED
(constant 1985 $-000's)

PROGRAM AREA	ACQUIRED	YET TO ACQUIRE
Sensor Based Robotics	800	1,540
Automation	170	1,600
Flexible Manufacturing	1,090	1,300
Robot Applications	0	500
Integrated Communications System	0	700
Machine Shop Equipment	70	430
Total	2,130	6,070

EXHIBIT 18
NRC LABORATORY STAFF AT CIIT

	PROFESSIONAL	TECHNICAL	OTHER	TOTAL
Now in Place	4	0	2	6
NRC Transfers	8	4	0	12
New Hires	18	11	3	32
Total	30	15	5	50

EXHIBIT 19
NRC PROJECTED ACTIVITIES AND BUDGETS

Activities:	Year	1	2	3	4	5
Laboratory Staff (# of persons)		20	35	50	50	50
Strategic Projects (# of projects)		2	3	4	4	4
Tactical Projects (# of projects)		4	8	12	15	18
Budgets:			(constant 1985 $-000's)			
Start-up:	Equipment	2,570	3,500	-	-	-
	Equipment Relocation	500	-	-	-	-
	Staff Relocation	400	300	-	-	-
Basic Budget:	Salaries	900	1,580	2,250	2,250	2,250
	Benefits	120	210	300	300	300
	Operation	1,000	1,600	2,000	2,000	2,000
	Minor Capital	100	150	200	200	200
	Major Capital	-	-	500	500	500
Incremental Annual:	Major Capital	-	-	500	500	500
	Operation	100	150	200	200	200
	Occupancy	400	400	400	400	400
Total		6,090	7,890	6,350	6,350	6,350

ROLE OF THE MANITOBA RESEARCH COUNCIL

The Manitoba Research Council (MRC), an agency of the Manitoba government, provides a wide range of technical services to a diverse client base in Manitoba and elsewhere in Canada through its Industrial Technology Centre (ITC). Established in 1977, ITC has grown to over 80 persons. In 1985, ITC recorded over 6,000 contacts with industry, 500 fee-for-service contracts and client revenues of $2.5 million. Over the last five years earned revenues have grown from zero to $2.5 million. ITC is now 60% self-sufficient.

NRC's Industrial Research Assistance Program (IRAP) Field Advisory Service has worked very closely with MRC/ITC and has contributed to MRC/ITC's success. IRAP has enabled many smaller firms to undertake their first project with MRC/ITC. This is an excellent example of the synergism that will occur, on a larger scale, within CIIT. The IRAP Winnipeg Office will continue its close working relationship with MRC/ITC.

MRC will transfer to the Institute that portion of its Industrial Technology Centre that relates directly to the mission of CIIT. Divisions to be relocated are noted in Exhibit 20. The staff complement will total 65, consisting of 31 professionals, 22 technical and 12 administrative support persons.

MRC/ITC's established contacts with industry and its array of services will provide a point of entry for local industry to learn about and access other CIIT resources. About 85% of MRC/ITC's past projects have been with smaller firms. About 70% have been with Manitoba clients and 30% with clients across Canada. MRC/ITC has worked with the resource sector (10% of past projects), manufacturers (61%) and the service industry (29%).

MRC/ITC's presence will strongly support the Institute's mission. Examples of past client projects which relate to manufacturing technology include:

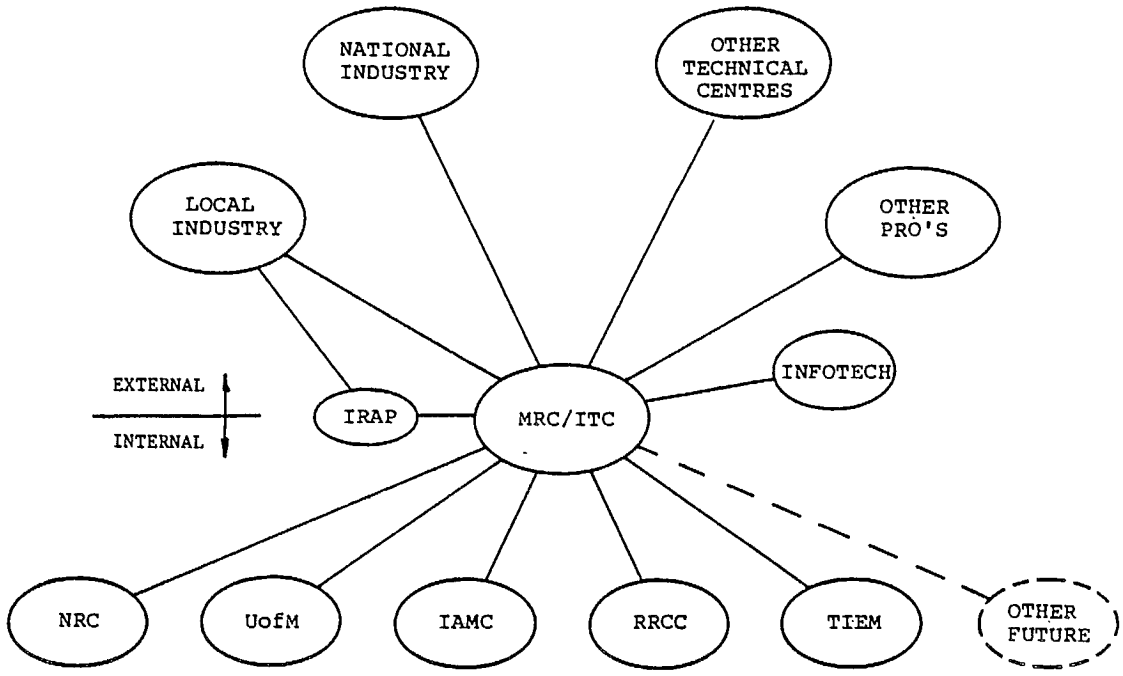
- automation of moulding lines for a local foundry,
- automation of a redi-mix concrete plant,
- human factors modelling database (Japanese partner),
- preproduction component runs on 5 axis NC mill,
- computer aided bus design for three companies, and
- CAD/CAM services for agricultural equipment firms.

A complementary and synergistic relationship will exist between MRC/ITC and NRC. MRC/ITC will undertake shorter term projects typically with smaller firms. NRC will conduct longer term projects typically with larger firms. Both will share equipment and staff in support of each other's projects. The linkages between MRC/ITC and resources internal and external to CIIT are illustrated in Exhibit 21.

EXHIBIT 20
MRC/ITC DIVISIONS TO PARTICIPATE IN CIIT

Computer Aided Engineering
Electronics & Electrical Engineering
Mechanical Engineering
Manufacturing Engineering
Metallurgy & Materials Science
Administrative and Support Staff

EXHIBIT 21
INTERNAL AND EXTERNAL LINKAGES TO MRC/ITC



The selected portions of MRC/ITC which will move to CIIT will occupy the second floor of the Institute, consisting of 33 offices and 24 laboratories, plus one-half of the library and one-third of the workshop. Together these areas amount to about 2,100 square meters or 34% of building space exclusive of common areas. MRC/ITC is willing to manage the entire workshop, related shipping/receiving/storage areas, the library and reception functions. It has the management systems in place to carry out these tasks on behalf of the Institute.

The areas to be occupied will be furnished and equipped at MRC/ITC's expense, partially through the relocation of existing assets. The major items of equipment to be moved and estimated values are noted in Exhibit 22. The building is not entirely suitable to MRC/ITC's use. Minor modifications will be needed. Leasehold improvements, at MRC/ITC's expense, for proper installation of equipment will amount to $ n/a *. In addition, a further $ n/a of expense will be incurred to plan and carry out the move.

A further cost which must be borne is that associated with duplication of administrative services for those divisions of MRC/ITC which will remain at MRC/ITC's present site. MRC/ITC's Chemistry and Biotechnology Divisions are not considered compitable with the mandate of CIIT and will remain at their existing site on Niakwa Road.

Exhibit 23 summarizes anticipated MRC/ITC levels of activity, budgets and client revenues (constant 1985 dollars). It should be noted that not all MRC/ITC projects will relate directly or exclusively to manufacturing technology. Other types of projects will continue to be carried out and some non-industrial clients will continue to be served. However, MRC/ITC's past activities have been heavily focused in the areas identified in the CIIT mission and, through interaction with other Institute participants, the MRC/ITC service mix will continue to grow in those directions.

The Computer Aided Engineering Division of MRC/ITC operates one of Canada's most comprehensive collections of engineering design software. In addition, through linkages with the Canadian Institute of Metalworking, the Structural Dynamics Research Corporation, Calma Corporation and Prime Canada, Ltd., it offers over 20 specific industrial training courses on computer aided engineering, computer aided design, computer aided manufacturing and numerically controlled machining applications.

* NOTE: Budget estimates have been established but are subject to release by the Government of Manitoba and were not available for this document.

EXHIBIT 22
MRC/ITC EQUIPMENT TO BE RELOCATED
($-000's)

Computer Aided Engineering	1,750
Electronics & Electrical Engineering	340
Mechanical Engineering	613
Manufacturing Engineering	58
Metallurgy & Materials Science	506
Office Furnishings	50
Total	3,317

EXHIBIT 23
MRC/ITC ACTIVITIES, BUDGETS AND CLIENT REVENUES

Year	1	2	3	4	5
MRC/ITC Staff	65	70	76	82	89
Client Contacts	5,500	5,700	5,900	6,100	6,300
Fee-for-Service Contracts	425	450	475	500	525

(constant 1985 $-000's)

Incremental Start-up:
  Leasehold Improvements
  Moving Costs

Basic Budget:
  Core Funding
  Client Revenue — not available at this time

Incremental Annual:
  CIIT Occupancy

Total

Covered by MRC/ITC Budgets

Additional Funds Needed

ROLE OF EDUCATIONAL INSTITUTIONS

Participation of educational institutions in CIIT will increase the rate of transfer of university-based research into industry, will make scientific resources more readily available to solve industry's problems and will facilitate technical education and training. This wide scope of purpose and limited space in CIIT dictates a highly selected presence. The primary role will be to forge linkages from industry to the pool of resources in both local and national universities and colleges. On-site research, education and training will be integrated with activities of other CIIT participants.

The University of Manitoba (U of M) and Red River Community College (RRCC) will be represented on site. Linkages to other institutions will be formed. Other Canadian colleges and universities will be encouraged to participate. To date, three other universities have been contacted and all three are very interested (Universities of Brandon, Winnipeg and Saskatchewan). Appendix 3 contains correspondence expressing the interest of these organizations.

Plans indicated here are preliminary as there is little sense in detailed planning until NRC and MRC/ITC commit. U of M will occupy 309 square meters of space (6 offices, 5 laboratories and one seminar room). Their share of annual building expenses will be $59,000. U of M research activities will also use NRC and MRC/ITC laboratories. Educational activities will share in the use of other seminar/meeting areas. U of M's incremental start-up and annual operating costs are estimated at $ n/a and $ n/a respectively.

In their liaison role the U of M offices will be a point of contact for industry to tap resources at the Fort Garry and Health Sciences campuses. Examples of linkages are shown in Exhibit 24. Staff exchange programs between CIIT, industry and the university will be promoted. Particular attention will be given to promoting commercialization of university research. In its research role, selected U of M faculty and graduate students will occupy space on a project-specific basis. They will collaborate on NRC and MRC/ITC projects and will conduct fee-for-service projects of their own for industrial clients. Access to CIIT's advanced equipment will greatly facilitate these activities. Typical projects are noted in Exhibit 25.

Educational and training courses of both the U of M and RRCC will benefit from coordinated access to specialized equipment at CIIT. Continuing and cooperative education programs will be developed, responsive to industry's needs. Courses at CIIT will make important contributions to university degree programs and certificate programs will be developed. Technology transfer will be supported through development of seminars, conferences and workshops. Other CIIT staff will contribute to these activities. Fees and tuition will make many of these activities financially self-sufficient.

RRCC will occupy 140 square meters of space (3 offices, 1 lab and 1 seminar room). Their share of annual building expenses will be $27,000. There will be sharing of other spaces. Offices will serve as an industry contact point with other college resources. Training and retraining courses specific to industry's needs will be developed and delivered. Preliminary budget estimates for RRCC are $ n/a for start-up and $ n/a annual expenses. Employment & Immigration Canada (EIC) are interested in the concept of CIIT and will financially assist industry to access these training courses.

EXHIBIT 24
EDUCATIONAL INSTITUTION LINKAGES

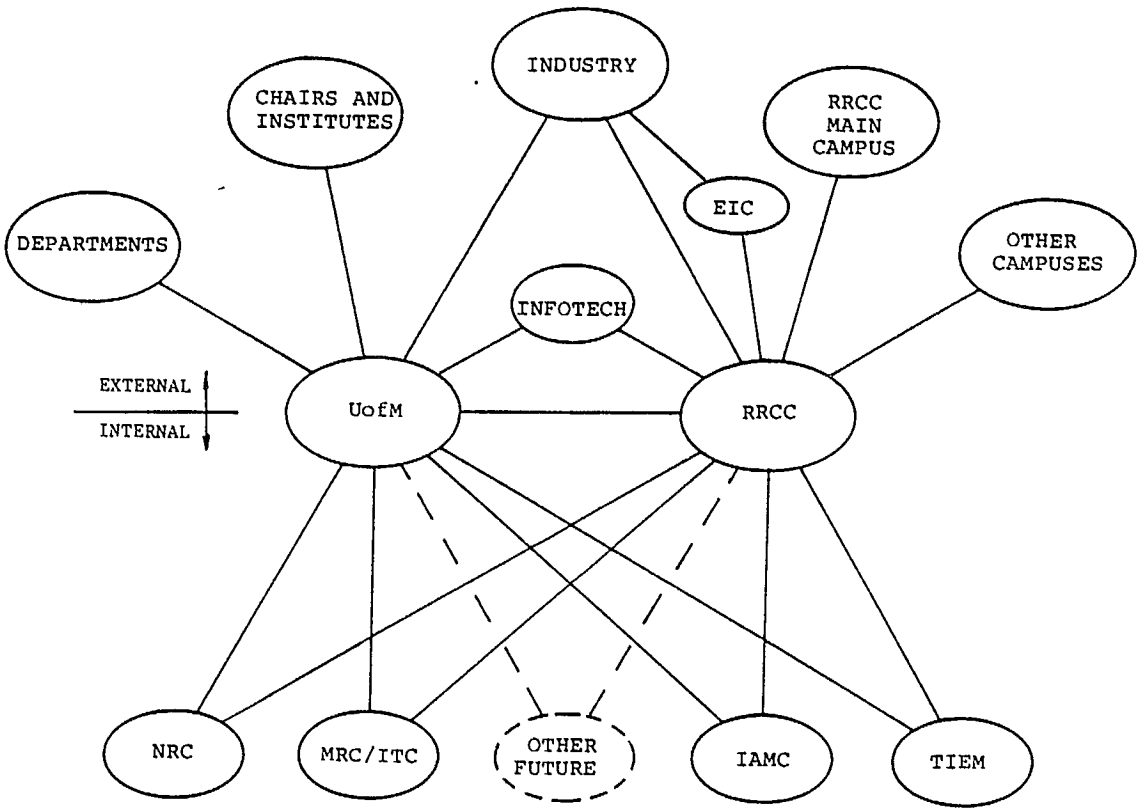


EXHIBIT 25
EXAMPLES OF U of M - CIIT JOINT RESEARCH

Generic:
- Artificial Intelligence
- Computer Vision
- Robotics
- Flexible Manufacturing
- Computer Aided Engineering

Specific:
- Computer applications to increase productivity
- Custom microchip designs for CAD/CAM
- Automated shade sorters for garment manufacturers
- Inventory and quality control systems
- Monitoring of structures by acoustic emissions

PRIVATE SECTOR PARTICIPATION

The Implementation Team contacted many firms and associations and group presentations were made to industry and trade associations and professional societies (see Appendix 4). These contacts were largely with organizations in Western Canada. With only a few exceptions the concept of CIIT was well received and applauded. The hesitation of Canadian industry in general to make formal project and financial commitments at this time relates to the stage that CIIT is at - that of informing industry what CIIT is all about.

A number of notable firms and associations have corresponded expressing specific interests and outlining possible future relationships with the Institute (see Appendix 5). This includes:

Bristol Aerospace, Winnipeg	Versatile Farm Equipment, Winnipeg
Control Data Canada, Vancouver	CP Rail, Winnipeg
Pratt & Whitney Canada, Montreal	Northern Telecom, Winnipeg
Boeing of Canada, Winnipeg	Monarch Industries, Winnipeg
Federal Industries, Winnipeg	Simon-Day, Winnipeg

Manitoba Fashion Institute Inc., Winnipeg
Electronics Industry Association of Manitoba
Canadian Manufacturers' Association
Manitoba Association of Architects

Bristol Aerospace and Pratt & Whitney have in place preliminary plans for cooperative development projects involving the Institute. Also, TIEM Canada, a private management training organization has expressed a desire to participate in CIIT. Details are provided in the following section.

Consultation with Canadian industry concerning the need for CIIT began in 1980, as noted in the Introduction of this report. The concerns expressed during that earlier consultation process need to be fully appreciated in order to understand the potential for industry participation in the Institute. Suffice here to say that manufacturing technology became a top priority for NRC. Concrete expressions of industry's needs can be found in the numerous CAD/CAM and manufacturing technology centres that have sprung up, largely in Eastern Canada (and worldwide) over the last five years, at universities, colleges and dedicated centres such as the Ontario Centre for Advanced Manufacturing (OCAM). However, Canada's needs and particularly Western Canadian needs, are still not well served. These centres are only now beginning to fill part of a widening technology gap.

CIIT's relationship with industry will need to go through three phases before there is full utilization and self-sufficiency of the Institute. First, industry needs to learn about the concept, resources and programs of CIIT. The Implementation Team, due to limited time and resources, has only scratched the surface. This report, when public, will assist. Secondly, most firms, being (short term) profit oriented, need confidence that CIIT has the resources to deliver services in a professional manner, on time, on budget and in confidence. The credibility of MRC/ITC, NRC and others will aid this process but time and good management will be required.

Thirdly, time is needed to grow. Most provincial research organizations have

taken 15 to 20 years to reach levels of 50% to 70% self-sufficiency. OCAM has a target of 50% self-sufficiency. It hopes to achieve this by its fifth year. Targets are for CIIT to reach full self-sufficiency within five years. Innovative management approaches will help attain these goals.

Industry participation will take many forms, only some of which will earn revenue for the Institute, as noted in Exhibit 26. General Inquiries and Casual Inquiries will result in few revenue projects - yet these interactions are very important vehicles for technology transfer, through referral to data sources, commercial sources of help and other technical centres. Substantive Inquiries typically need a number of hours of staff time to provide proper response. These are reactive services.

Technical Proposals will arise from industry as well as from within CIIT. Preparation of some proposals may generate small revenues. Some proposals will lead to Technical Consulting wherein CIIT will assist industry to understand needs and to find, evaluate, adapt, and install existing Canadian or foreign technologies. This will be CIIT's most important service to promote near term recovery and growth in Canadian industry. Delegated and Cooperative R&D Projects will earn revenues for CIIT as described in the later section of this report titled Institute Program and Revenues.

The Institute will provide selected Ongoing Support Services, at a fee, to those firms which cannot afford expensive equipment or find convenient commercial services. Prime examples are shared access to CIIT's computer-aided engineering and design systems. Proactive Technology Transfer activities will include seminars, conferences, workshops, demonstrations and missions. These will be extremely important activities to create awareness in industry and to stimulate adoption of technology. Revenue potential is limited. Educational and training courses will involve 100's of industrial managers, workers and smaller entrepreneurs. Nominal tuition and course fees are expected.

EXHIBIT 26
FORMS AND LEVELS OF INDUSTRY PARTICIPATION IN LATER YEARS

FORM	NUMBER OF EVENTS	NUMBER OF PEOPLE	REVENUE POTENTIAL
General Inquiries	1,000's	1,000's	nil
Casual Technical Inquiries	1,000's	1,000's	nil
Substantive Technical Inquiries	100's	100's	nil
Technical Proposals	100's	100's	limited
Technical Consulting	100's	100's	substantial
Delegated R&D Projects	10's	100's	substantial
Cooperative R&D Projects	10's	100's	substantial
Internal R&D Projects	10's	100's	nil
Ongoing Support Services	100's	100's	substantial
Proactive Technology Transfer	10's	1,000's	limited
Technical Training Courses	10's	100's	nominal
Managerial Training Courses	10's	100's	nominal

OTHER PARTICIPANTS

The three organizations discussed below will collaborate with CIIT. They may also locate in the Institute which would enhance participation. Planning and budgeting activities are at a very preliminary stage, awaiting decisions by NRC and MRC/ITC. It is possible that one or more of these groups may decide not to locate at CIIT or may not be able to due to individual budget constraints or the growing concern for adequate space to meet current and future needs of all participants. Except for NRC and MRC/ITC, this report reflects space rationing at levels lower than requested by most other participants. In the event that any of these groups do not locate in CIIT, space allocated to them would be reallocated to others or held in reserve.

Industrial Applications of Microelectronics Centre

IAMC has a staff of 23 and is active in microelectronics research and development, fee-for-service contracts with industrial clients and development of educational and training courses dealing with the industrial application of microelectronics. These latter activities, in particular, have been very well received and praised by industry. The staff of 23 and special purpose equipment at IAMC would be very complementary to NRC and MRC/ITC. IAMC fee-for-service work is akin to the activities of MRC/ITC and IAMC staff would likely work more often with MRC/ITC. They would also work with U of M and RRCC staff on educational and training activities.

IAMC has tentatively been allocated 285 square meters (less than their request). This space consists of 10 offices and 4 laboratories. Further reduction may be required as final negotiations are undertaken with other participants. Based on this space, IAMC annual contribution to Institute building operating expenses will be $55,000.

TIEM Canada

This private company has developed and is now marketing in North America a set of computer-based management and training programs to select, develop and support successful small entrepreneurs. TIEM will screen and help train promising small business people who then look (with increased hopes of finding) for venture capital from local communities and financial institutions. TIEM Canada has received funding support from the Department of Regional Industrial Expansion. They will be opening a Winnipeg facility in April, 1986. The Winnipeg Business Development Corporation (WBDC) has been negotiating on behalf of the Winnipeg business community. They indicate agreement in principle for TIEM to locate in CIIT.

TIEM will support the mission of the Institute in four ways. TIEM will:

- help small entrepreneurs wishing to commercialize the technologies arising from the Institute,
- link with the U of M and RRCC in their educational and training activities,

- link with the entrepreneur incubation facilities and small business development programs offered by the Manitoba Department of Business Development and Tourism, and

- provide an entry point for local industry who would then learn about and perhaps use other resources in the Institute.

The concept is to locate the TIEM regional office and computer training facilities in CIIT. This would not include any entrepreneur incubation space. Incubation facilities at other locations, such as the facilities operated by the Government of Manitoba at Niakwa Road, will be used. TIEM has been allocated 173 square meters consisting of 5 offices and 3 laboratory spaces. They will share space in other seminar and conference rooms. Based on 173 square meters, TIEM's contribution to annual building operating expenses will be $33,000.

Manitoba Research Council Directorate Office

The MRC Directorate Office, consisting of 4 staff, have been asked to consider the relocation of their offices to CIIT. This would help provide focus of local technical and scientific activities in and around CIIT. MRC requires 3 private offices and a larger general reception office equivalent to two standard offices, giving the total equivalent of 5 offices. This amounts to about 82 square meters and the annual contribution to CIIT building operating expenses would be $16,000.

Other Potential Participants

In order to promote liaison and interaction with industry it may be attractive to propose to various local industrial associations to locate their office operations within CIIT, provided this does not require an inordinate amount of space. Candidates could include the Electronic Industry Association of Manitoba plus a number of others. In addition, use of conference and seminar rooms and cafeteria facilities can be offered to local chapters of various technical and professional societies for member meetings and their various other programs. Both these actions will promote casual traffic in the Institute and make technical and professional persons in the community more familiar with CIIT. The Institute could, over time, become recognized as the meeting place for these mutual-interest groups.

SYNERGISM OF RESOURCES

A spectrum of resources is needed to ensure the development and application of advanced manufacturing technologies, as well as adoption of appropriate foreign technologies, by Canadian industry. As pointed out in the Nielsen Report (New Management Initiatives, The Honourable Erik Nielsen), Canada already has many of the resources to address these needs. However, they sit in relative isolation of each other and, in some critical instances, are remote from industry. Needs and resources can be summarized as follows:

Basic research	- primarily conducted in universities
Applied research	- NRC and some provincial centres
Development	- provincial and private industry
Industrial application	- provincial technical centres, private labs
Technical training	- universities, colleges, commercial training.

CIIT will contain resources from all elements of this spectrum. This is the unique and experimental aspect of the program. Synergistic effects will enhance services to industry and will promote greater effectiveness and cost efficiency of resource utilization. Furthermore, linkages to external resources will generate similar benefits on the national level.

Internal Synergism and Benefits

Exhibit 27 illustrates major internal linkages. Linkages described below will exist amongst all participants. Those illustrated are only representative. Synergistic effects and economy of resources will come from:

A- Sharing of unique, advanced equipment and laboratory space; sharing of special technical knowledge and information; sharing of specialist staff for joint, cooperative technical projects.

B- Sharing of training facilities and training aids; sharing of special knowledge and course materials; sharing of staff for development and delivery of courses.

The result will be an enhanced, economical resource centre to provide to industry:

1. basic research support
2. applied research support
3. development assistance
4. applications assistance
5. technical training
6. managerial training
7. hiring pool of technically qualified persons.

External Synergism and Benefits

There are local and regional external resources that will support, and be supported by, the Institute. Nationally, there are resources similar to those of CIIT which address the needs of their own local and regional industries. Many of these organizations constitute national resources that can be tapped and supported by CIIT. Exhibit 28 notes organizations most relevant to CIIT and the estimated number of organizations that may have relevance. Staff secondments and exchanges, cooperative projects and technical information exchange will be the major mechanisms to achieve synergism and economy. Linkages will also occur with national centres in other countries.

EXHIBIT 27
INTERNAL SYNERGISM AND BENEFITS TO INDUSTRY

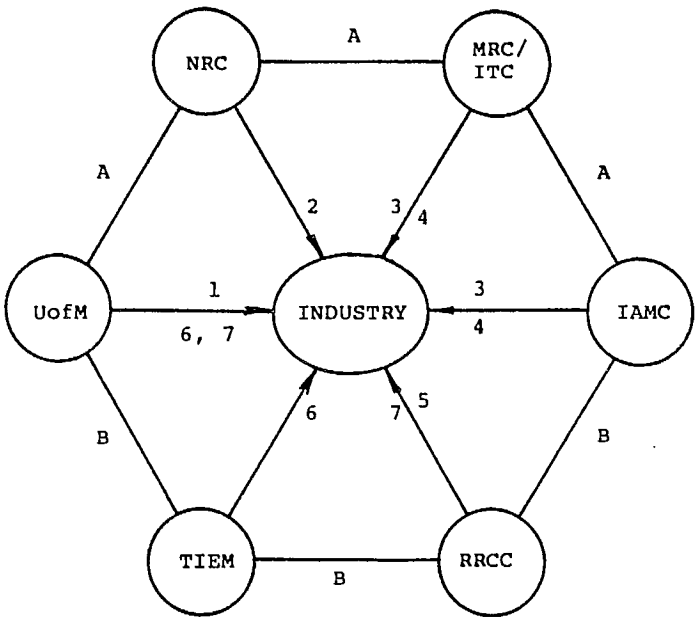


EXHIBIT 28
EXAMPLES OF EXTERNAL RESOURCES RELEVANT TO CIIT

TYPE	REPRESENTATIVE ORGANIZATIONS	ESTIMATED TOTAL NUMBER
Federal Labs	NRC's Ottawa and Montreal laboratories.	4
Universities & Related Institutes	Saskatchewan, Calgary, Carleton, McMaster, Queen's, Toronto, Waterloo, McGill, Nova Scotia, Canadian Institute for Advanced Research.	18
Provincial Technical Organizations	Infotech, OCAM, New Brunswick Manufacturing Technology Centre, Centre for Advanced Resource Technologies.	19
PRO's	All Provincial Research Organizations.	8
Micro-electronic Centres	Alberta, Sherbrook, Queen's Ontario Centre for Microelectronic Technology, Nova Scotia Applied Microelectronics Institute.	7
Colleges & Entrepreneur Centres	Ryerson, BCIT, SAIT, Kelsey, Winnipeg South Vocational Training Centre, Waterloo, numerous Eastern Canadian colleges.	24
Associations	CMA, National Manufacturing Technology Information Centre, Society of Manufacturing Engineers, etc.	20-25

The Winnipeg location of CIIT will promote synergism in two ways. Manitoba's substantial manufacturing and resource industries are a microcosm of Canadian industry which will promote first hand experience for CIIT across many sectors. Winnipeg's central location will ensure geographic equality not only for industry but for other technical resource bodies wanting to relate to the Institute.

In conclusion, the mission, composition and programs of the Institute will be directly responsive to the desires of the Government of Canada, as expressed in the Nielsen Report:

- to enhance international competitiveness of Canadian industry,
- to develop an integrated R&D approach in consultation with industry and the provinces,
- to improve effectiveness and client-responsiveness of programs,
- to establish self-sufficient centres,
- to reduce duplication and fragmentation of efforts,
- to improve industry access to technology, and
- to join with provinces and end users to consolidate and rationalize resources.

The Canadian Institute of Industrial Technology will achieve these goals and will serve as a model for increasing the effectiveness and economy of utilization of technical resources across Canada.

BUSINESS PLAN

IMPLEMENTATION ACTION PLAN

CANADIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY

MANAGEMENT STRUCTURE

Being an innovative organization with a mission to achieve better utilization of Canada's technological resources, CIIT must reflect innovative approaches in design of its management structures. The Institute's management structure is illustrated in Exhibit 29.

Management Board

The Management Board will be an independent board made up of a majority of members from the private sector. The board will have the task of ensuring that the programs and resources of CIIT are responsive to industry's needs. The board will assist in creating awareness and use of CIIT facilities by industry across Canada. It will promote cooperative interaction and coordination of CIIT with other appropriate national technical bodies to promote collaboration and avoid duplication of resources. Another important responsibility will be to ensure the development and delivery of a variety of proactive technology transfer programs. The board will be a working board and will identify needs and develop plans in conjunction with the Executive Office. Implementation of these plans will take two forms - the day-to-day activities of the Institute Executive Office and, of prime importance, the follow-up actions of individual board members within the organizations which they influence and control.

Board membership will consist of three types of members; a senior officer from the parent organization of each of the participants, representatives of national umbrella organizations (industry and professional associations, etc.) and senior executives from individual private sector firms. The desire for industry sector and geographic representation will be addressed. Board members will have national credibility, vision and influence. Candidate members from the private sector include senior executives of innovative Canadian firms and established developers and suppliers of manufacturing technology products and services. The Chair will be a private sector member and the CIIT Executive Director will be the Secretary.

In summary, the primary role of the Management Board will be to ensure relevance of CIIT to industry needs, uptake of programs by Canadian industry and synergism amongst internal and external resources.

Executive Office

The Executive Office will consist of an Executive Director and a number of support staff. Activities will focus heavily on external roles. The primary role will be liaison with the private sector to understand industry needs and to market the resources of CIIT to meet those needs. Development and management of an array of proactive technology transfer programs will be another major responsibility to ensure more rapid movement of technology into industry. Another important role will be liaison with other technical centres, universities and colleges across Canada to promote collaboration. The Executive Director must be a dynamic industry leader, well recognized and respected across Canada and must be capable of providing the vision and leadership needed for CIIT to succeed in its mission.

Internal Program Committee

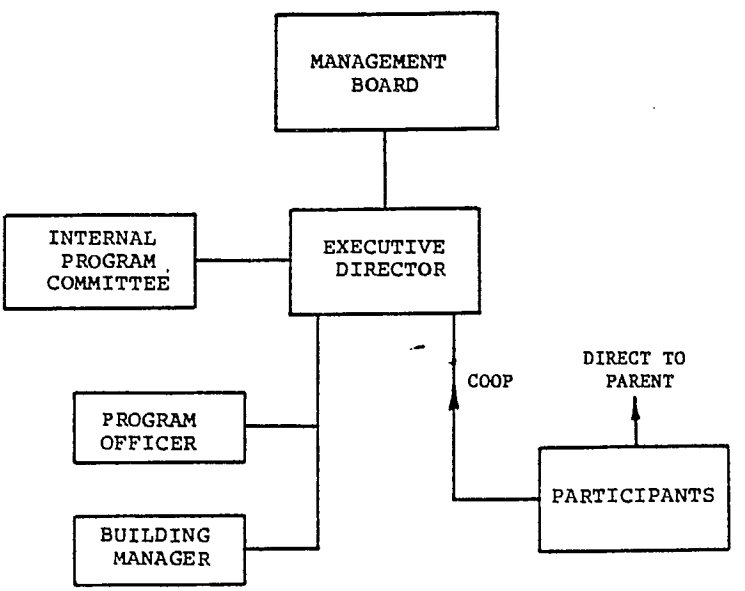
The responsibilities of this committee will center on various issues related to the smooth operation, integration and growth of resources with the Institute. The committee's primary role will be to ensure synergism amongst participants. Committee members will recommend projects for collaboration and will take proactive measures to ensure team efforts on projects, when appropriate. Measurable targets for joint interaction will be set. Project teams will consciously be drawn from different groups. Longer term budgets and development plans of each participant will be presented for information and discussed to promote longer term coordination. The committee will also coordinate and schedule the use of common facilities and will monitor and help direct the proper operation and maintenance of the building. All permanent participants will be represented by their senior on-site official. The Chair of the committee will be the Executive Director and secretarial services will be provided by the Executive Office.

Building Manager

The Building Manager will ensure proper operation and maintenance of plant following the policies, procedures and budgets approved by the building owner and the Internal Program Committee. Responsibilities of the Building Manager will include negotiation and management of outside service contracts, supervision of maintenance staff, review and approval of utility and service invoices and preparation of building operation budgets.

There is a requirement for interim management of CIIT until such time as the Executive Director is appointed and the Executive Office and Management Board have developed to the stage where they can assume full responsibilities. An interim Federal-Provincial management committee should be established to fill these needs. Also, NRC should initially retain ownership of the building with transfer to CIIT at some point in the future.

EXHIBIT 29
CIIT MANAGEMENT STRUCTURE



ACCOUNTABILITY

The requirements for and mechanisms to ensure accountability arise from the mission of CIIT, its management structure and the nature of the participants in the Institute. Three fundamental principles have been addressed:

1. Interaction of participants will be managed through processes of cooperation, negotiation and persuasion. This situation calls for an Executive Director with exceptional abilities, credibility and interpersonal skills.

2. Participants in CIIT all have established reporting lines to parent organizations and have various boards of directors, etc. These relationships will not be altered or disturbed.

3. The Management Board will review and ratify major program and resource shifts and developments of participants within CIIT.

Financial Accountability

Apart from payment of a share of building operating expenses, individual participants will have no financial accountability to CIIT. Individual budgeting, financial reporting and banking arrangements of each participant will continue "as is". As a courtesy, and as pertinent to mutual interests, participants may share financial plans and reports with one another. The Executive Office will be accountable for budgets, monthly and annual reporting against budgets and banking arrangements pertaining to building operations. Apart from banking, these responsibilities will be delegated to the Building Manager. The Executive Office will be accountable to the Management Board for budgets, quarterly and annual reporting against budgets and banking arrangements for the Executive Office. A financial auditor will be appointed by the Management Board to audit Executive Office and Building Operation financial affairs.

Performance Accountability

Individual participants will continue their established reporting and performance evaluation processes. As a courtesy, and as pertinent to mutual interests, they may share these documents with one another. The Building Manager will prepare short and longer term plans for proper building operations, maintenance and repairs which will be translated into budgets. The Building Manager will implement policies and procedures laid down by the Internal Program Committee and will carry out day-to-day management of building service contracts. Performance will be monitored by all participants with exceptions referred to the Internal Program Committee for resolution.

The Executive Office will be accountable to the Management Board for achievement of performance goals of internal programming and development as set down by the Internal Program Committee. This committee, using the secretarial service of the Executive Office, will prepare an annual and longer range plan for "internal synergism" and will issue an annual report of achievements against the plan. These documents will be issued to participants, their

employees, the Executive Office, the Management Board and the parent organization of each participant. These will be unclassified public documents.

The Executive Office will be accountable to the Management Board for achievement of performance goals of national programming and development of CIIT as set down by the Management Board. The Executive Office will prepare an annual and longer range plan for marketing of CIIT resources and for fostering of working linkages with other technical bodies, on a national basis. These documents will be issued to Management Board members, their parent organizations, the Executive Office, and to CIIT participants, their employees and their parent organizations. These will be unclassified public documents.

The Management board will appoint an external performance evaluator who will conduct an independent review of the adequacy of the above internal and national planning processes and will present an independent evaluation of progress opposite the mission of the Institute. This performance evaluation will be conducted every three years. Evaluation reports will be issued to the Management Board, Executive Office, participants, their employees and their parent organizations. Reports will be unclassified public documents.

Legal Accountability

All participant will retain ownership of assets they bring to the Institute. They will be responsible for repair and maintenance and any property and liability insurance. Participants will indemnify CIIT against any claims arising from participants' actions including client contracts and visitors to participants' premises. Leasehold improvements will be at participant's costs and will remain with the building owner. An occupancy contract will be drawn up with the owner of the property.

Participants will continue to contract directly with clients and will do their own invoicing, receivables and banking. Joint ventures of participants will be conducted through a prime-subcontractor(s) structure with the prime contractor responsible for contracting with the outside client. Letters of understanding will be drawn up by participants in joint ventures. Industry participants who take up temporary residence in CIIT to conduct projects will have a designated "project person" from one of the permanent participants who will act as mentor and administrative liaison. This person will often be someone involved in technical aspects of the project.

CIIT will be a federally incorporated, non profit organization. It will hire employees on one year, renewable contracts. Contracts will be gross dollar contracts, eliminating the need for any CIIT fringe benefit programs. CIIT will contract with outside organizations for provision of such building services as security, janitorial service, snow and waste removal, landscape maintenance, major repairs, etc. A contract will be arranged with a food service management firm to staff and operate the cafeteria. Parking facilities will either be managed by the Building Manager or put out to contract.

PHYSICAL FACILITIES

The land and building of the former Science Place Canada facility will become the location for CIIT. This 5.2 acre site is located in downtown Winnipeg in the area now undergoing urban redevelopment under the North Portage Development Corporation. CIIT is a much valued high technology component of this large social, community, commercial and industrial redevelopment program. Staff and visitors to the Institute will make important contributions to the social revitalization of Winnipeg's core area.

The building, consisting of the enclosed areas noted in Exhibit 30, occupies 3.0 acres of the site. The balance of land will be available for possible future expansion of the Institute, for location of high technology firms wishing to utilize CIIT resources first hand and for firms wishing to commercialize developments arising from the Institute. The building will be completed in early 1986 and has many unique construction features necessary to its intended function as a technical institution. These features, reflected in the capital cost of $30 million, include stable, high load foundations for machine and workshop areas, environmentally-controlled computer equipment rooms, distribution systems for utilities and communication networks to laboratories throughout the building and special storage and material handling facilities.

Interior finishings are in place and include standard wall and floor coverings. All office and laboratory divider walls are in place. Cafeteria kitchen equipment and customer seating and conference room furnishings are in place. Participants will be expected to furnish and equip the areas they occupy and to make any necessary leasehold improvements, at their own

EXHIBIT 30
BUILDING INTERIOR SPACE USES AND SIZES

(square meters)

	Basement	1st	2nd	3rd	4th	Total
Laboratories (72 units)			720	720	720	2,160
Offices (102 units)			562	562	562	1,686
Workshop		1,698				1,698
Workshop Stores		341				341
Shipping & Receiving		318				318
Lobby		145				145
Conference Room		200				200
Library		540				540
Admin Offices (11 units)		181				181
Cafeteria		445				445
Staff Lockers		58				58
Dead Storage/Extra Shop	1,298					
Parking	3,115					
Total Useable Area	4,413	3,926	1,282	1,282	1,282	12,185
Gross up (corridors, walks, washrooms, etc.)						5,554
Total Interior Space						17,739

expense. NRC and MRC/ITC will locate equipment and furnishings into the workshop and library as well as into their dedicated spaces. Basic office furnishings will be provided by NRC for the spaces designated for Industry Participants and CIIT Administration.

Exhibit 31 summarizes the preliminary allocation of space, by size and location, to the participants in CIIT. Final negotiations as to amount of space and location will be required particularly for those organizations designated for the third floor. Seminar rooms consist of two adjoining laboratory units. The building will need minor modifications in order to make it totally suitable for participants' uses. These leasehold improvement costs will be paid for by participants.

EXHIBIT 31
OCCUPATION OF SPACE

		(square meters)				
		1st	2nd	3rd	4th	Total
NRC:	Laboratories (24 units)				720	
	Offices (34 units)				562	
	Workshop (1/3 of total)	566				
	Library (1/2 of total)	270				2,118
MRC/ITC: .	Laboratories (24 units)		720			
	Offices (34 units)		562			
	Workshop (1/3 of total)	566				
	Library (1/2 of toal)	270				2,118
INDUSTRY:	Laboratories (7 units)			210		
	Offices (10 units)			165		
	Workshop (1/3 of total)	566				941
U of M: ..	Laboratories (5 units)			150		
	Seminar Room (1 unit)			60		
	Offices (6 units)			99		309
RRCC	Laboratories (1 unit)			30		
	Seminar Room (1 unit)			60		
	Offices (3 units)			50		140
IAMC:	Laboratories (4 units)			120		
	Offices (10 units)			165		285
TIEM:	Laboratories (1 unit)			30		
	Seminar Room (1 units)			60		
	Offices (5 units)			83		173
MRC Office:	Offices (5 units)	82				82
ADMIN: ...	Offices (6 units)	99				99
	Participant Total	2,419	1,282	1,282	1,282	6,265
	Common Support Service Areas					5,920
	Total Useable Area					12,185

INSTITUTE PROGRAM AND REVENUES

Program

Exhibit 32 presents a listing of the major types of CIIT programme activities with identification of the lead agency that most often would deliver the service or lead the team of CIIT participants delivering the service. Activities will be both reactive (inquiries, R&D requests, etc.) and proactive (R&D suggestions, technology transfer, etc.). Reference should be made to the earlier Industry Participation section for an indication of the nature of these activities.

Industry Delegated R&D Projects are those in which industry cannot or will not participate directly due to lack of technical resources, etc. These projects may be carried out by one CIIT participant or a team of participants working under the lead agency. Industry Cooperative R&D Projects are those in which the industrial client participates, allocating company staff and equipment to work as part of the team. In some cases, staff and equipment will reside with the firm and in other cases, temporary residence will be taken up in CIIT to work day-to-day with the CIIT team. Cooperative projects may involve just one CIIT participant or a team headed by the lead agency.

Internal R&D Projects are those not directly involving an industrial participant, although industrial needs and potential end users will be kept in mind. CIIT participants will conceive, find funding for and carry out these projects individually or in teams. U of M basic research and NRC's strategic research projects fall in this class.

Exhibit 32 provides a very preliminary indication of the level of programme activities, by event, for each major category. These estimates are based in part on NRC and MRC/ITC activity forecasts presented in earlier sections of this report.

Revenues

CIIT participants will charge for services per their established practices and will retain all of these revenues for their own use. Fees for technical services will be charged by MRC/ITC, IAMC and U of M whether as sole contractor or as part of a team. In the latter case, invoices will be submitted by other participants to the lead contracting agency. U of M and RRCC will establish course fees and tuitions per their normal practices. Participants will thus work towards and improve their own self-sufficiency, enhanced through joint access to industrial clients. Various federal and provincial support programs are available to help industry purchase these services including IRAP, DIP, IRDP, Manitoba Jobs Fund, etc. A further synergism to be realized by CIIT is the assistance of linking the private sector with these government support programs.

CIIT operating expenses will be supported in part by industrial clients. In the case of Industry Cooperative R&D Projects, industrial tenants will be asked to pay the full cost of space occupancy for the period of time in residence. Recovery of $180,000 annually is needed to pay for the space allocated to the use of industry.

EXHIBIT 32
CIIT PROGRAM ACTIVITY PRO FORMA
(# of events)

	LEAD AGENCY	YEAR 1	YEAR 2	YEAR 5
Inquiries:				
General	CIIT)			
Casual Technical	all)	1,000's	1,000's	1,000's
Substantive Technical	all)			
Technical Proposals	all	100's	100's	100's
* Technical Consulting	MRC/ITC	100's	100's	100's
* Industry Delegated R&D Projects:				
Tactical Research	NRC)			
Technical Development	MRC/ITC)	50-70	60-80	100-120
Applications Assistance	MRC/ITC)			
* Industry Cooperative R&D Projects:				
Tactical Research	NRC)			
Technical Development	MRC/ITC)	10-20	10-20	40-50
Applications Assistance	MRC/ITC)			
Internal R&D Projects:				
Basic Research	U of M)			
Strategic Research	NRC)	3-4	5-6	8-10
* Ongoing Support Services	MRC/ITC	100's	100's	100's
* Proactive Technology Transfer	CIIT			
Seminars	all)			
Conferences	all)			
Workshops	all)	5-10	10-20	20-30
Demonstrations	all)			
Missions	all)			
* Training:				
Technical Training	RRCC)			
Managerial Training	U of M)	5-10	10-20	30-40
Entrepreneurial Training	TIEM)			

* Activities which will produce revenues from industrial clients.

CIIT Executive Office revenues will be generated in relation to the needed, valued services the office will provide with payment received, from industrial clients, as an "Institute Fee". It will be encumbent on the CIIT Executive Office to plan and execute its National Promotion, National Liaison and Proactive Technology Transfer roles in such a way that a modest percentage fee can and will be paid by beneficiaries of the Institute. These fees will have four components:

Project Fees - NRC resources are in most cases, now provided to industry free of cost. Where NRC resources are used on Delegated or Cooperative R&D projects and Technical Consulting Assignments, a 15% Institute Fee will be charged, based on the "cost recovery" value of NRC's input. If other CIIT participants are involved with NRC as part of a team and are collecting fees, then a 5% override will be added to their fees. This would not apply to participants' day-to-day project activities, but only to those more limited number of larger projects involving NRC.

Exhibit 33 illustrates the point. In this example, a project which would cost industry $1 million if done alone by industry, would cost industry $670,000 when done in collaboration with a CIIT team. In the latter instance, the client would bear an internal cost of $400,000, plus the $200,000 of fees paid to other possible CIIT participants involved in the project (MRC/ITC, U of M or IAMC) plus $70,000 of "Institute Fees" payable to CIIT. CIIT would realize fees of $60,000, being 15% of the "fair market cost" of NRC input to the project plus a 5% override ($10,000) on the fees earned by the other participants. The Executive Office will justify fees through helping to identify and "sell" these larger projects and by helping to structure and arrange the internal team. To assist cash flow, retainer agreements will be pursued with potential first users. These amounts will be worked off in future years.

Membership Fees - Private sector companies and other organizations will be approached to purchase general membership in the Institute, the benefits of which will be preferred access to facilities and possible discount on services provided by CIIT.

Proactive Technology Transfer - Wherever possible the cost of the proactive technology transfer activities noted in Exhibit 32 should be self-liquidating. The Executive Office will strive to manage these activities to generate a surplus (registration fees, sale of materials to other centres, etc.)

Royalty Fees - CIIT will share in royalty, licensing, etc. fees arising from the commercialization of technology developed at the Institute. Agreements and arrangements will be made with each participant in this regard. Income will be in the future.

The "fair market cost" of NRC's proposed 50 person laboratory is $5 million annually. If 60% of activities are devoted to NRC tactical projects and involvement on other participants' teams, then Institute Project Fees could approach $450,000 per year. Exhibit 34 provides targets for Executive Office revenue from the above four sources.

EXHIBIT 33
EXAMPLE OF REVENUE FLOWS

Cost to a Client to do the Project Alone			$1,000,000
Cost to a Client for a Cooperative Project:			
Client's internal cost	40%	$400,000	
NRC input	40%	0	
Other Participant fees	20%	200,000	
CIIT Institute Fees:			
15% of NRC value		60,000	
5% of other fee value		10,000	
Client Cost for a Cooperative Project			$670,000

EXHIBIT 34
PROGRAM OFFICE REVENUE TARGETS
(constant 1985 $-000's)

TYPE OF REVENUE	YEAR				
	1	2	3	4	5
Project Fees					
Earned	0	50	100	200	400
Retainer	0	100	100	100	0
Membership Fees	0	10	20	40	50
Technology Transfer	0	10	30	50	100
Royalties	0	0	0	0	10
Total	0	170	250	390	560

OPERATING EXPENSES

There are three separate but related financial considerations in the operation of the Institute, the financial needs of the participants to carry out their own programs, financial requirements to operate and maintain the building and the financial needs of the Executive Office.

Participants

The financial needs of participants are not a responsibility of the Institute. All participants will have their own operating and capital budgets provided through their own particular core funding and/or revenue-generating activities.

Building Operations

Exhibit 35 summarizes the estimated annual expenses to operate and maintain the grounds and building in a typical year after start-up. These estimates are based on NRC experience in operation of Ottawa (Montreal Road laboratories) and Montreal (IMRI) facilities. Amounts have been adjusted through a review of comparative cost indices for Winnipeg, Ottawa and Montreal. First year expenses may prove to be somewhat less due to a gradual increase in utility expenses and outside services as operations are phased in. However, to be conservative the full budget is assumed for Year 1.

Executive Office

Exhibit 36 presents a preliminary estimate of Executive Office annual operating expenses. It should be understood that this budget is illustrative only, as the Management Board will have the ultimate responsibility of setting the elements and amounts of the budget. The amounts shown are for a typical year after start-up and will be less in the first year due to phasing-in.

The demanding responsibilities of the position of Executive Director calls for a unique blend of experience and skills not easily found. This position should be filled by an industry leader well-regarded by the private sector across Canada. The promotional budget assumes a total of 200 person-days of travel a year shared by the Executive Director and the Program Officer. This again is viewed as a minimum. Management Board expenses assume a board of about 12 persons, meeting four times yearly. CIIT will compensate members for out-of-pocket travel and accommodation expenses. Professional services include legal and audit fees and consulting assistance for planning, executive search and performance evaluation audits. The Proactive Technology Transfer budget is intended to supplement any shortfall in full cost recovery of those activities.

EXHIBIT 35
BUILDING ANNUAL OPERATING EXPENSES
(1985 $-000's)

		Typical Year
Property Tax: Grant to Winnipeg in lieu of tax		$600
Contracted Services:	Security	150
	Janitorial	70
	Minor repairs	30
	Snow removal	8
	Landscape maintenance	7
	Refuse removal	20
Utilities:	Electricity	125
	Natural gas	50
	Water & Sewer	15
Staff:	Building Manager	45
	Maintenance Helper	20
Contingency (5%)		60
	Total	$1,200

EXHIBIT 36
EXECUTIVE OFFICE ANNUAL OPERATING EXPENSES
(1985 $-000's)

	Typical Year
Executive Office Staff	225
Promotion	105
Management Board	40
Technology Transfer Programs	40
Professional Services	40
Occupancy and Supplies	30
Contingency (15%)	60
Total	500

FINANCIAL PRO FORMAS

Building Operations

Building operating expenses will be recovered, with a surplus, through three means:

- payment of expenses by participants, prorata to space occupied,
- income from parking space rental, and
- income from a cafeteria contract with a food service firm.

Exhibit 37 summarizes these income flows for the first five years of operations. Participant payments are based on assumed occupancy commitment dates as indicated in the Implementation Schedule. Parking receipts are based on the assumption of leasing 80% of underground stalls for 8 months of the year at current going rates for the area. Cafeteria operations, assumed to be open to the public, will take time to move to a profitable position. A small fixed rental plus percent of gross sales will provide income to CIIT.

This forecast depends on three key factors:

- commitment by both NRC and MRC/ITC to take possession of space promptly and start paying their share of expenses,

- move in of the rest of the participants, all or in part, to occupy the balance of space, with payment of expenses to start at time of possession of space, and

- tight control of building operating expenses.

In Year 1, expenses should be lower than budget by at least $150,000 due to phasing-in. The accumulated deficit of $420,000 is based on conservative assumptions and will very likely be less than indicated provided the majority of participants move in at the times indicated in the Implementation Schedule and close attention is paid to building management. Future surpluses from expense recoveries will be retained as a reserve for major capital repairs or for use in capital improvements.

Executive Office Operations

Executive Office revenue forecasts are summarized in Exhibit 38. The forecasted deficit and breakeven point are considered optimistic but achievable. Expenses should not be restrained below the levels indicated if the Executive Office is to have the resources to properly carry out its mandate. Executive Office start-up funds of $1,140,000 required over the first five years of operation, should be viewed as a minimum amount.

Start-up Financial Requirements

Using these forecasts, the one-time start-up operating funds, to permit CIIT to work towards and achieve self-sufficiency, are as noted in Exhibit 39. A contingency factor of 15% has been added to cover uncertainties in the estimating process. Start-up funds required will total $2 million over the first four years of operation.

EXHIBIT 37
BUILDING OPERATING EXPENSES PRO FORMA
(constant 1985 $-000's)

		SPACE (m^2)	YEAR 1	2	3	4	5
Revenues:	NRC	2,118	405	405	405	405	405
	MRC/ITC	2,118	300	405	405	405	405
	Industry	941	30	60	90	100	110
	IAMC	285	27	55	55	55	55
	U of M	309	29	59	59	59	59
	RRCC	140	13	27	27	27	27
	TIEM	173	33	33	33	33	33
	Admin	99	15	20	20	20	20
	MRC Office	82	13	16	16	16	16
	Sub-Total	6,265	865	1,080	1,100	1,120	1,130
	Parking Rentals		20	45	45	45	45
	Cafeteria Lease		0	0	25	25	25
	Total		885	1125	1180	1190	1200
Expenses:			1200	1200	1200	1200	1200
Surplus (Deficit)			(315)	(75)	(20)	(10)	0

EXHIBIT 38
EXECUTIVE OFFICE EXPENSES PRO FORMA
(constant 1985 $-000's)

Year	1	2	3	4	5
Revenues:	0	170	250	390	560
Expenses:					
Staff	140	225	225	275	275
Promotion	80	105	105	105	105
Management Board	20	40	40	40	40
Technology Transfer	30	40	40	40	40
Other	130	130	130	130	130
Total expenses	400	500	500	550	550
Surplus (Deficit)	(400)	(330)	(250)	(160)	10

EXHIBIT 39
PROJECTED START-UP DEFICIT
(constant 1985 $-000's)

Year	1	2	3	4	Total
Building Operations	315	75	20	10	
Executive Office	400	330	250	160	
Contingency (30%)	210	110	70	50	
Total	925	515	340	220	2,000

IMPLEMENTATION SCHEDULE

For the purposes of this action plan, "day 1" of the implementation schedule is assumed to be that point in time when a firm, binding agreement is reached by the Governments of Canada and Manitoba to proceed with the Institute. With this commitment in place, all participants will have the confidence to begin detailed planning and to start to undertake the major activities noted in Exhibit 40.

An interim Federal-Provincial management committee will need to be struck to act on behalf of the Executive Office until the Executive Director is in place. The committee will develop position descriptions, hire a Building Manager and initiate search activities for Executive Office staff. It will likely take at least four months for the Executive Director to come on site, following which the remaining Executive Office positions will be filled and the Management Board appointed. Two months of planning of board and office activities will be required following which the Executive Office will initiate sustained serious national promotion of CIIT.

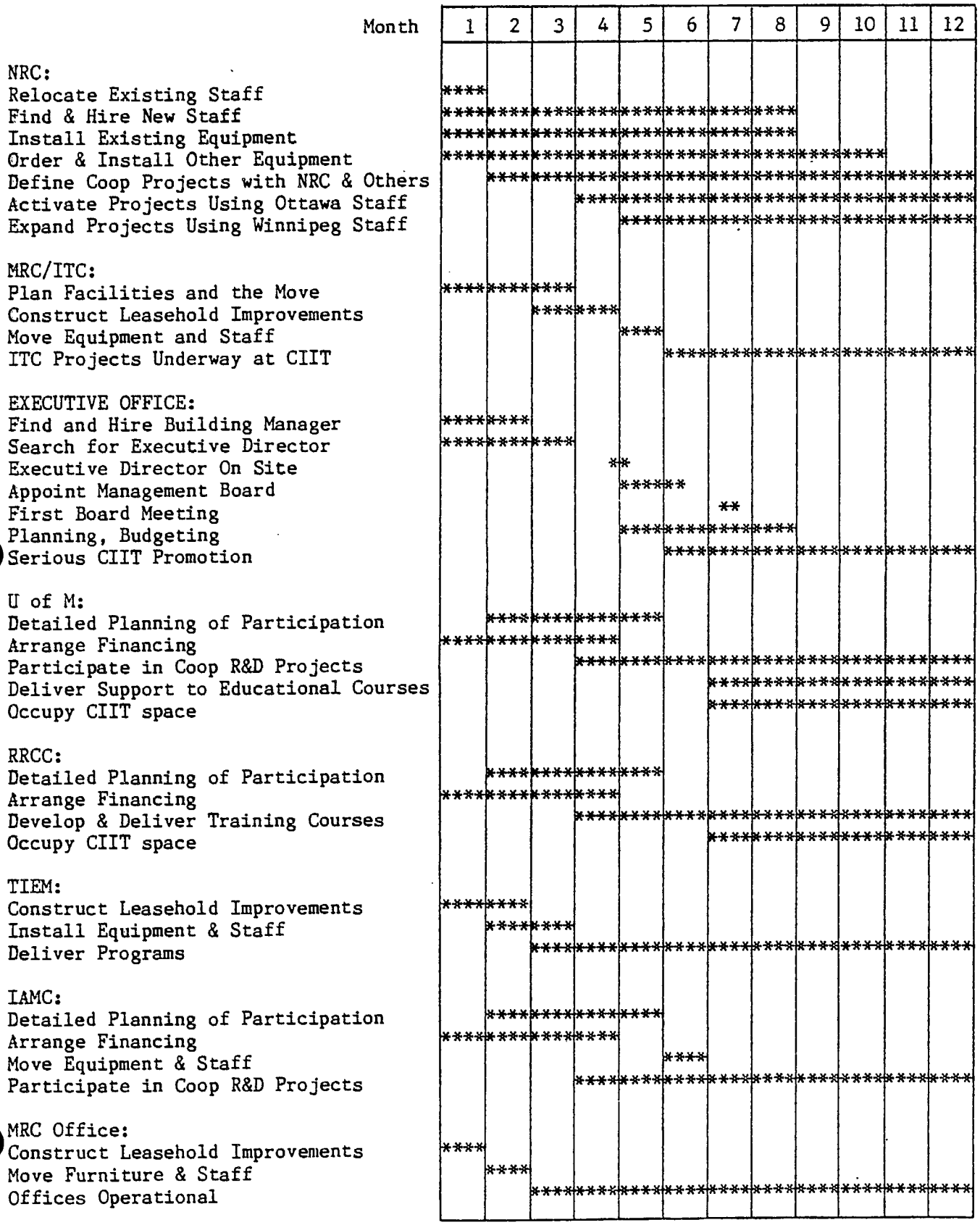
MRC/ITC will require about three months to conduct detailed planning of space utilization, to plan leasehold improvements and to schedule the physical move. MRC/ITC will take early possession of space and will be fully operational and conducting ongoing MRC/ITC projects by Month 5.

NRC staff already designated to the laboratory will move into the building. Other positions will be advertised and staff hired with all "first year" hires expected to be in place by Month 8. Existing equipment (now in use at MRC/ITC, U of M and IAMC) will be installed. Equipment to be purchased by NRC in the first year will be quoted, ordered, delivered and installed over a 10 month period. Definition and promotion of cooperative projects using NRC, U of M, IAMC, MRC/ITC and the resources of other outside technical centres, including NRC Ottawa, will begin in Month 2. Early projects using seconded NRC Ottawa staff will get underway in Month 4. New Winnipeg staff will join these projects and initiate others starting in Month 6.

Industry's early involvement will be initiated mainly by NRC and MRC/ITC activities to identify and establish projects involving industrial clients or industrial beneficiaries. A number of larger, longer term projects will be initiated by industrial participants who will utilize NRC, U of M and other resources as well as placing company staff on site to manage and contribute to projects. Towards the end of Year 1, the efforts of the Executive Office and Management Board will see an increase in industrial participants on site.

U of M, RRCC and IAMC all need time to carry out detailed planning of their participation and space and facility needs in CIIT and to arrange funding, both for their staff and program activities and for their share in the operating expenses of the Institute. These groups will likely take possession of space by Month 6 but technical staff can become involved in projects prior to this through use of NRC or MRC/ITC space. If a positive decision is reached by governments, TIEM and MRC Directorate Office would be ready to commit on "day 1" and would be operational on site within two to three months.

EXHIBIT 32
IMPLEMENTATION SCHEDULE - MAJOR ACTIVITIES



APPENDICES

1. Implementation Team Terms of Reference
2. Implementation Team Members and Observers
3. Expressions of Interest from Educational Institutions
4. Industrial Firms and Associations Contacted
5. Expressions of Interest from Industry

APPENDIX 1

IMPLEMENTATION TEAM TERMS OF REFERENCE

The object of the Implementation Team is to develop an action plan for Science Place Canada as a national facility, the goal of which is to give Canadian Industry a comparative advantage over its competitors in the field of manufacturing technology and related activities.

The main responsibilities of the implementation team will be to make recommendations to Ministers in the following areas:

- a program for the facility,
- provision for its management and accountability mechanisms,
- a suitable legal framework in which the facility can operate,
- an appropriate financial and business plan, and
- provision of an automatic process of evaluation of the plan.

In making its recommendations, the implementation team will aim to achieve the following goals for Science Place Canada:

- that it have substantial private sector participation;
- that it make a substantial contribution to the creation of new industries and the strengthening of existing ones; and
- that it be self-financing within a period of five years.

Membership

The Implementation Team is to be chaired by Dr. L.M. Wedepohl, Dean of Applied Science at the University of British Columbia. Membership of the team will be finalized following recommendations to be made by the Chairman to Minister Siddon.

Timing

The Implementation Team will provide an interim report to Minister Siddon by September 30, 1985 and its final report by December 31, 1985.

APPENDIX 2

IMPLEMENTATION TEAM MEMBERS AND OBSERVERS

Members of the Implementation Team and the organizations and interest groups represented by each are as follows:

Dr. L.M. Wedepohl	Chairman
Dr. A. Collin	Secretary and Chief Science Advisor, Ministry of State for Science and Technology
Dr. K. Pulfer	Vice-President, Finance, National Research Council
Mr. A. Mayman	Director, Institute for Manufacturing Technology National Research Council
Prof. M. Vaisey-Genser	Associate Vice President (Research), The University of Manitoba and Chair of The Manitoba Research Council
Mr. R. Bullock	Vice-President, Engineering, Bristol Aerospace Ltd. and Vice-Chair, Manitoba Research Council
Mr. L. Chow	Manager, Government Contracting, Pratt and Whitney Canada Inc.
Mr. J. Ingraham	President, I.D.S. Ventures, Winnipeg

The last two members represent the Canadian Manufacturers' Association.

The following is a list of the observers to the team:

Mr. J.D. Blackwood	Federal Economic Development Coordinator, Manitoba
Mr. H.G. Eliason	Assistant Deputy Minister, Industry, Trade and Technology, Government of Manitoba
Mr. H.A. Reynolds	Regional Executive Director, Manitoba, Department of Regional Industrial Expansion, Government of Canada.

APPENDIX 3

UNIVERSITY OF SASKATCHEWAN

DEAN OF
ENGINEERING

SASKATOON, CANADA
S7N 0W0
(306) 966-5273

January 20, 1986

Dr. L.M. Wedepohl
Chairman
Implementation Team
Science Place Canada
Suite 307 - 155 Carlton Street
Winnipeg, Manitoba
R3C 3H8

Dear Dr. Wedepohl:

The purpose of this letter is to confirm my enthusiastic support of the plans being put forth by the National Research Council for Science Place Canada. A centralized research facility of this type would enable industry, the Council, other government agencies and the universities in western Canada to work together on problems of vital importance to the future well-being of Canada. Our College of Engineering would be most eager to take part in such activities.

As you know, our College of Engineering has built up during the past twenty-five years considerable strength in the area of automatic control systems. We have ten faculty working in this area and they have considerable knowledge and experience in adaptive control, fluid power (hydraulic) control systems and instrumentation. A decision has been made to move strongly into robotics and this activity will be complemented by those of our faculty in our Department of Computational Science who are skilled in artificial intelligence.

In order that our activities can be of practical use, we will have to have access to specialized facilities and the opportunity to work with industry. In this regard, we look upon Science Place Canada as a place where our faculty could do some of their research and spend some of their sabbatical leaves, and a place to where we could send some of our graduate students to carry out their thesis research.

You already know that our college has played a very important role in the development of the high-technology industry in Saskatchewan. Science Place Canada may be the opportunity that we need to expand our activities in robotics, and perhaps others areas.

Yours sincerely,

P.N. Nikiforuk
Dean of Engineering

PNN/gjb
cc: Mr. M. Auld

APPENDIX 3

THE UNIVERSITY OF WINNIPEG
OFFICE OF THE PRESIDENT
AND VICE-CHANCELLOR

515 PORTAGE AVENUE
WINNIPEG, MANITOBA R3B 2E9
CANADA
PHONE: (204) 786-9214

86/01/16

Dr. L. Martin Wedepohl, Chairman
Implementation Team
Science Place Canada
Suite 307
155 Carlton Street
Winnipeg, Manitoba
R3C 3H8

Dear Martin:

Further to our discussion last week about Science Place Canada, I am pleased to confirm my personal support of the concept for the Institute as set forth in your report to the Federal Government. I earnestly hope that your recommendations will be approved and implemented.

As you know, The University of Winnipeg is a relatively small (total of 8,000 students), simply structured (basically one good Faculty of Arts and Science), centrally located institution (virtually across the street from Science Place Canada). Our size and structure allow us to be more flexible and responsive than is possible in many universities, and our location provides us with a special mission to serve the urban community at the heart of Canada's central city. Our history goes back to 1871, when our predecessor Manitoba College was established on the site where Science Place Canada is now located. Consequently, we have a particular interest in the future of that place.

We believe that Science Place Canada, properly conceived, would constitute a marvellous economic boost for Winnipeg and Manitoba; moreover, it would serve as an important national resource and could operate as a "lighthouse" that might well be emulated eventually in other regions of the country. The concept of the Institute as developed in your report seems sound to us. As we have indicated to you during previous discussions over the past few months, The University of Winnipeg hopes to participate in many aspects of the Institute's work as set forth in your report, sometimes in cooperation with the University of Manitoba and Red River Community College, both of which we work with closely in various ways. In particular though, we have a special interest in the "human resources" aspects of what we hope the Institute will do; for example, we could foresee establishing a centre of excellence for the study of socioeconomic and ethical aspects of technological development which might well be located in Science Place Canada, and we would also be interested in using our well established Continuing Education capability to help people in our community generally to learn about the kinds of technological developments that would be taking place in Science Place Canada.

. . . 2/

For the several reasons mentioned above, then, I am happy to indicate my strong support for the concept of Science Place Canada as set forth in your report, my hope that the government will accept and implement your recommendations, and my promise to do everything we can at The University of Winnipeg in helping Science Place Canada fulfill its crucial mission.

Thanks for including us in the excellent job you have done on this, and best personal regards to you.

Yours sincerely,

Robin H. Farquhar
President

RHF/ba

SOUTH WINNIPEG TECHNICAL CENTRE

130 Henlow Bay, Winnipeg, Manitoba, Whyteridge Industrial Park off Waverley Telephone (204) 477-4590
Mailing Address: P.O. Box 145, Fort Whyte, Manitoba R0G 0R0

January 22, 1986

Dr. L.M. Wedpohl
Chairman
Implementation Team
Science Place Canada
Suite 307 - 155 Carlton Street
Winnipeg, Manitoba
R3C 3H8

Dear Dr. Wedepohl:

South Winnipeg Technical Centre has had a keen interest in Science Place Canada from it conception. Having this technology and expertise available could provide a strong link to industry for the training institutions. We see many potential areas of cooperation to benefit both your and our clients, the industries of Manitoba.

The Canadian Jobs Strategy program is providing training institutions with a new challenge to meet the needs of industry for skilled workers. Institutions, such as ours dedicated to training and retraining need to strengthen our ties with industry. Your facility with modern innovative equipment and resources, and technological assistance capabilities, could provide the impedus and encouragement industry needs to move forward, and we would look forward to pooling resources wherever feasibile to help industry solve problems related to training and retraining skilled workers.

We would be pleased to assist you in any way we can to bring this project into operation.

Sincerely,

Ted Ramsay

E.A. Ramsay
Director

ER/db

APPENDIX 4

Firms and Associations Contacted by the Implementation Team

Ancast Industries	Winnipeg
Association of Consulting Engineers of Manitoba	Winnipeg
Association of Professional Engineers of Manitoba	Winnipeg
Bell Northern Research	Ottawa
Boeing of Canada	Winnipeg
Bristol Aerospace	Winnipeg
Burroughs Peripheral Products Group	Winnipeg
CMA Manitoba-Saskatchewan Division	Winnipeg
CP Rail	Winnipeg
Canada Wire and Cable	Winnipeg
Canadian Aircraft Products	Vancouver
Canadian Manufacturers' Association	Toronto
Carte Electric	Winnipeg
Control Data Canada	Vancouver
Cybershare	Winnipeg
Delro Industries	Winnipeg
Diffracto	Windsor
Digital Equipment of Canada	Winnipeg
Dominion Bridge	Winnipeg
Dominion Securities Pitfield	Winnipeg
Electro Trac Circuits	Winnipeg
Electronics Industry Association of Manitoba	Winnipeg
Federal Industries	Winnipeg
Horizon Robotics	Saskatoon
ID Engineering	Winnipeg
IDS Ventures	Winnipeg
IEEE Computer Society	Winnipeg
Inventronics	Brandon
Manitoba Association of Architects	Winnipeg
Manitoba Fashion Institute	Winnipeg
Monarch Industries	Winnipeg
Norlus	Winnipeg
Northern Telecom	Winnipeg
Pratt & Whitney	Montreal
Promar Industries	Regina
Quantic Laboratories	Winnipeg
Society of Manufacturing Engineers	Winnipeg
Sperry Defence Systems Division	Winnipeg
Sperry Information Systems Division	Toronto
Summit Securities	Winnipeg
Symbolic Computer Products	Winnipeg
Underwood McLellan	Winnipeg
Vardax	Vancouver
Versatile Farm Equipment	Winnipeg
Westinghouse Canada	Winnipeg

APPENDIX 5

The Canadian Manufacturers' Association

Helping Manufacturers Grow

January 22, 1986

Dr. L.M. Wedepohl
Chairman
Implementation Team
Science Place Canada
Suite 307 - 155 Carlton Street
WINNIPEG, Manitoba
R3C 3H8

Dear Dr. Wedepohl:

The Canadian Manufacturers Association Manitoba Branch is the primary association representing most sectors of Manitoba Manufacturing. We're a part of the National body of the CMA whose members produce in excess of 75% of all goods manufactured in Canada.

Canadian Manufacturers Association Manitoba Branch supports your team and look forward to the prompt completion of your implementation plan for the new "Science Place Canada" facility in down town Winnipeg. We see a consolidated facility which will co-ordinate and compliment efforts of existing technology, research and development, and education centres in our city and province. Also, with Winnipeg in the geographic centre of Canada, we see S.P.C. useful in co-ordinating the efforts and overcoming regional restrictions of existing centres throughout Canada.

As Canadians, we strive for a healthy economic climate. Good economic performance will stimulate innovation and vice versa. Those countries which adapt new technology before others, derive the most benefit. The combined effort and support of governments, industry and educators is essential to adapt this new technology. This support includes both human resource and financial.

The long range plans and goals of S.P.C. must ultimately include a return on investment as well as tangible economic benefits to all Canadians. In other words in order to succeed, the centre will have to depend on increasing input, with respect to program initiatives and capital from the private sector throughout Canada.

. . ./2

37-1313 Border Street
Winnipeg, Manitoba R3H 0X4

Manitoba manufacturers offer full support and assistance in utilization of the facility and in formulating future plans.

We commend you for your efforts and look forward to seeing your implementation plan brought to fruition.

Yours very truly,

J.R. Benedict
Chairman
Manitoba Branch
JRB/dp

APPENDIX 5

PRATT & WHITNEY CANADA

Pratt & Whitney Canada Inc.

Box 10
Longueuil, Québec J4K 4X9
514/647-3770

Elvie L. Smith
Chairman of the Board

9 January 1986

Dr. L.M. Wedepohl
Chairman
Implementation Team
Science Place Canada
Suite 307-155 Carlton Street
Winnipeg, Manitoba
R3C 3H8

Dear Dr. Wedepohl,

Some months ago, the CMA Science & Technology Committee nominated Lewis Chow, Manager, Government Contracting, Pratt & Whitney Canada, to represent the CMA and the Science & Technology Committee on the Implementation Team announced by the Federal Science Minister, Tom Siddon. We supported this appointment without hesitation because we felt the private sector could contribute to the Implementation Team's recommendations as to how to use and manage Science Place Canada. Further, we at Pratt & Whitney Canada, have felt for sometime the need for Canadian manufacturers to greatly improve their competitiveness in the world market-place by improving their methods of manufacturing. Our strong conviction on this subject has resulted in our starting construction of our first Computer Integrated Manufacturing (CIM) plant and this will involve the expenditure of $90 million. In due course CIM will be applied throughout our plants.

We would hope that Science Place Canada would be able to support our Computer Integrated Manufacturing activity. We are also looking forward to seeing in Science Place Canada a world-class manufacturing research capability to serve Canadian industry generally.

As you know, I have been working with Murray Auld and Lewis Chow to support the implementation efforts and will continue to do so.

Yours sincerely,

Elvie L. Smith

cn

APPENDIX 5

BOEING OF CANADA LTD.
WINNIPEG DIVISION

January 16, 1986

Dr. L. M. Wedepohl, Chairman
Implementation Team
Science Place Canada
Suite 307 - 155 Carlton Street
Winnipeg, MB
R3C 3H8

Dear Dr. Wedepohl:

The establishment of a new technology centre at Science Place Canada, Winnipeg, would be of significant interest to the Winnipeg Division of Boeing of Canada Ltd. The proposed technology centre incorporating government and university industrial research activities, technological development, industrial training and private sector participation can only provide beneficial results for Canadian industry and the nation as a whole.

Boeing of Canada Ltd. is currently establishing an in-house capability in computer aided engineering and design and would be most interested in applied research linking this technology with computer aided manufacturing. The application of robotics to manufacturing processes and nondestructive inspection techniques is critical to maintaining our competitive position in international markets.

Our area of interest is perhaps somewhat specialized because of the uniqueness of our manufacturing operations; however, we would be prepared to work with the technology centre staff on specific projects where areas of mutual interest can be identified.

We welcome the dedicated efforts being made by the Implementation Team to bring this project to fruition and wish you every success in achieving that objective.

Sincerely,

Lyle L. Bryson
Vice President-General Manager

LLB/aki

99 Murray Park Road, Winnipeg, Manitoba R3J 3M6 tel. (204) 888-2300 tlx. 07-57309

APPENDIX 5

bristol aerospace limited

P.O. BOX 874, WINNIPEG,
CANADA R3C 2S4
TELEPHONE (204) 775-8331
TWX 610-671-3598
TELEX 07-57774 — 07-57804

EXECUTIVE OFFICES

January 14, 1986

Dr. L. M. Wedepohl
Chairman, Implementation Team
Science Place Canada
307 - 155 Carlton Street
Winnipeg, Manitoba R3C 3H8

Dear Dr. Wedepohl:

Please accept this letter as a formal declaration of Bristol Aerospace's intent and desire to participate in the program for the Science Place Canada facility in downtown Winnipeg.

We share the concern that you have expressed about the need to increase productivity as one of the measures necessary to permit reduced production costs, which are becoming increasingly important as we strive to maintain a competitive position in both domestic and export markets. We agree that optimum use of technology will be required to achieve productivity improvements in both our shops and our offices.

We are not a large company, and as such, the participation that we can promise will be modest. We visualize two areas where we would find participation most beneficial:

(1) the provision of funding to help sponsor development activities that could be useful to our operation; and

(2) the provision of 1 or 2 rotating staff members who would be "attached" to scientists at the Centre to provide additional manpower resources. These people, after one or two years of attached service would return to our company with a considerable improvement in their knowledge, and with personal relationships with Centre staff that should encourage collaboration on future projects.

There may be other ways in which we could participate--if so, we would be prepared to discuss these at any time. We are currently developing a list of candidate programs which we would be prepared to sponsor, totally or in part, at the Centre, and would like the opportunity to discuss these with SPC staff as soon as they are identified.

Yours truly,

J. A. Bowden,
President.

WRB:emc

APPENDIX 5

HORIZON ROBOTICS
SYSTEMS [CANADA] INC.

January 27, 1986

To Whom it Will Concern:

Our company is a strong advocate of high technology or automated technology implementation through out Western Canada.

High technology is seen as a needed addition to our failing industries. Entrepreneur encouragement from solid sources and the tools required by them are the call to government. The development of the planned NRC center in Winnipeg could be such a tool.

We view the opening of such a center in Winnipeg as a catalyst to encourage growth of small and medium sized businesses in Western Canada. This building could help provide the synergism needed to stimulate high technology transfer into industry.

Time is of the essence and jobs for many people entering or re-entering the workforce are in the balance.

The development of this NRC building in Manitoba is an imperative direction to follow. Ontario alone, under the Ontario Centres for Advanced Manufacturing has four such development centers.

It is obvious Central Western Canada could not afford an institute of this calibre. Technology transfer will only come about through the cooperative efforts of industry, government and the education of the people.

We fully endorse the opening of this NRC building as soon as possible. Time is of the essence.

Respectfully,

Lindsay T. Oliver

Horizon Robotics

THE INDUSTRIAL ROBOT COMPANY

2502 THAYER AVENUE, SASKATOON, SASKATCHEWAN, CANADA, S7L 5Y2 (306) 934-1557

APPENDIX 5

MONARCH INDUSTRIES LIMITED

889 ERIN STREET, WINNIPEG, CANADA
TELEPHONE (204) 786-7921
TELEX 07-57175 CABLE "MONARCH"

MAILING ADDRESS: P.O. BOX 429 WINNIPEG R3C 3E4

January 16, 1986

L.M. Wedepohl
Chairman
Implementation Team
Science Place Canada
Suite 307 - 155 Carlton Street
Winnipeg, Manitoba
R3C 3H8

Dear Mr. Wedepohl:

We at Monarch are rather excited about the possibility of having a research centre for industries such as ours located in Winnipeg.

Basically we are manufacturers for the home and farm market and at times require technological information or assistance in design and testing of our products.

Some of our strongest competition is now being felt from the Orient on products that we have been manufacturing for years. New high tech products must be introduced to replace existing ones and there is no doubt that the research centre will be of valuable assistance.

I am enclosing a brochure covering our 50th Anniversary which will give you a better insight on our company's operation.

If we can be of any further service, please let us know.

Yours truly,

E.J. Klassen
Chairman of the Board

Enclosure

APPENDIX 5

January 22, 1986

Dr. L. M. Wedepohl
Chairman
Implementation Team
Science Place Canada
Suite 307-155 Carlton Street
Winnipeg, Manitoba
R3C 3H8

Dear Sir:

The Manitoba Association of Architects has a membership of 300 including 58 practising firms serving clients locally, nationally and internationally.

Our members would be very interested in helping support computer aided design facilities in Science Place Canada. Some of the benefits for our members would be:

1. Training/orientation of architects and architectural technologists on new CAD equipment and software.
2. Testing of various makes and types of CAD equipment and software before buying or leasing for one's own practice.
3. Time sharing CAD facilities by those practices unable to buy or lease their own equipment.
4. Keeping abreast of CAD innovations in order to remain competitive in our broad marketplace.
5. Being able to work more effectively with clients, related design disciplines and contractors who are already utilizing such systems on large, complex or highly technical projects.

We look forward to the successful implementation of your project. We would be happy to assist you in defining further the needs of our profession in the CAD field.

Yours very truly,

for: Terry Cristall, MAA, MRAIC
President

APPENDIX 5

Manitoba Fashion Institute Inc.
2nd Flr. - 70 Arthur St. / Winnipeg, Manitoba. R3B 1G7
TELEPHONE (204) 942-7314

November 18, 1985

L.M. Wedepohl
Chairman
Implementation Team
Science Place Canada
Suite 307 - 155 Carlton Street
WINNIPEG, Manitoba.
R3C 3H8

Dear Sir:

The Manitoba Fashion Institute, as the association of the apparel manufacturers in Manitoba, is very excited about the opportunities a centralized research facility would afford our industry. The prospect of having all available technological assistance under one roof and in our own back yard is one that should elicit maximum effort by the Province, the Federal Government and business, to ensure that start up is at the earliest possible date.

We cannot speak for all business, but the apparel industry would utilize such a facility and is prepared to offer its full support. Members of our association have, in the past, utilized the University and other Provincial and Federal agencies involved in applied research and dissemination of technological information. We cannot overemphasize the advisability of consolidating all these resources under one roof as proposed by the new national program.

We are more interested in applied research than pure research. We would visualize our industry using the facility to apply technology to specific problems on the factory floor as well as bending existing and innovative software to our use. Another area of interest would be the ability of such a facility to be on line with information services which would keep us aware of any international technological innovations as they became available. We would also look forward to the concept of several factories pooling their resources to solve an industry problem.

We congratulate your group on the dedication you bring to this project and we are at your service if we can help in any way.

Yours truly

MANITOBA FASHION INSTITUTE INC.

per Ray Winston
R. Winston, Executive Director

RW/ms

APPENDIX 5

CONTROL DATA CANADA, LTD.

510 Burrard Street, Suite 600
Vancouver, B.C. V6C 3C3
(604) 664-6400

CONTROL DATA

September 25, 1985

Dr. L.M. Wedepohl
Chairman, Implementation Team
Science Place Canada
Suite 307 - 155 Carlton Street
Winnipeg, Manitoba
R3C 3H8

Dear Dr. Wedepohl:

To confirm our recent discussion, Control Data is very interested in participating in Science Place Canada. Our interests in particular would be to contract for development of programs in the robotics and computer-aided design field. The total volume of development work would depend on success of initial projects measured against defined criteria.

In addition, Control Data would be willing to grant major reductions in the cost of accessing supercomputers (see attached article "The Spectacular Promise of Supercomputer Centres"). These contracts and grants would of course be made with the condition that major use would be made of Control Data technology.

We believe that the Control Data approach promoting the proactive distribution of technology and training to inidividual user sites is paramount to the successful operation of a high technology support facility such as the one planned for Manitoba. It would also serve as a cornerstone for those entrepreneurial enterprises requiring access that are located in Science Place Canada.

. . . 2

APPENDIX 5

CONTROL DATA CANADA, LTD.

We would be pleased to provide assistance in determining the needs of Manitoba industry for these services. I look forward to continuing our discussions of Control Data participation in Science Place Canada.

Yours truly,

CONTROL DATA CANADA

A. Bruce McKelvey
Vice President, Western Region

cc. Lorne Linden

ABM/pkb

APPENDIX 5

eiam
electronics industry association of manitoba

October 30, 1985

Dr. Martin Wedepohl
Chairman of the Implementation Team
for Science Place Canada
307-155 Carlton Street
WINNIPEG, Manitoba
R3C 3H8

Dear Sir:

As a result of your enjoyable presentation to our Annual Meeting on the 11th of September 1985, the EIAM have become aware of the efforts being made by your Implementation Team to define a new program to replace the Institute for Manufacturing Technology program previously planned by the National Research Council (NRC), which was one of the victims of Federal budget cuts announced on the 8th of November 1984.

Our industry was enthusiastic about the program planned by the NRC, as we perceived that a number of opportunities for Manitoba electronics firms would arise, both by doing business with NRC, and also by collaborative programs that would lead to new products and/or processes. We concur with the view that Canadian industry needs a significant improvement in productivity and that their improvement can, in part, be achieved through technology.

We were dismayed when the program was cut, and participated in local activities to lobby for a replacement. Therefore, we are pleased that you and your team are now taking the lead to define a new program, and would like to endorse your efforts as we understand them so far.

We appreciate your efforts to keep our industry informed, and hope that your plan will include significant private sector input in the execution of the program. May we also take this opportunity of thanking you for speaking to our members.

Yours truly,

Richard M. Jones
President, EIAM

206-894 ST. JAMES STREET, WINNIPEG, MANITOBA R3G 3J7 TELEPHONE (204) 943-7533

APPENDIX 5

SDL
SIMON-DAY LTD.

• P.O. BOX 488 • WINNIPEG • MANITOBA • R3C 2J6 • 204/786•5781 • TELEX: 07•57327 •

January 23, 1986

L.M. Wedepohl, Chairman
Implementation Team
Science Place Canada
307 - 155 Carlton Street
Winnipeg
R3C 3H8

Dear Sir:

Simon-Day Ltd. is a manufacturer of grain and seed cleaning and sizing equipment. We also manufacture a complete line of air pollution control equipment.

We feel that a centralized research facility would be of a great service to us. The prospect of having all available technological assistance under one roof and in our own back yard is one that should elicit maximum effort by the Province, the Federal Government and business, to ensure that start up is at the earliest possible date.

Simon-Day Ltd. would utilize such a facility and is prepared to offer its full support. Our equipment is best tested under actual operation and we feel that the Research Centre would be able to assist us with this. Items such as stress on the machines under full load, vibrating action etc.

We are interested in applied research than pure research. The ability of this facility to be on line with information services which would keep us aware of any international technological innovations as they become available would be a great asset.

If we can be of any service please contact us.

Yours truly,

R.J. Bevis
Corporate Vice President
Sales and Marketing
RJB/hm

APPENDIX 5

northern telecom

Northern Telecom
Canada Limited

1455 Mountain Ave.
Winnipeg, Man.
R2X 2Y9

Tel. (204) 633-7200
TWX 610-641-95

1986-01-27

Mr. L.M. Wedepohl,
Chairman,
Implementation Team,
Science Place Canada,
Suite 307, 155 Carlton Street,
Winnipeg, Manitoba.
R3C 3H8

Dear Mr. Wedepohl,

I am writing to express my support for a centralized Research Facility in Winnipeg. An applied research center for technological assistance to manufacturing facilities ensures our competitive edge and continued growth in the electronics sector. I feel the both levels of government, education institutions plus business should expedite the start up of this center.

This center would maximize transfer of knowledge plus eliminate duplication of effort because of closeness and working relationships that would develop under the same roof.

We anticipate using such a facility as a source of innovative improvements to our operations, and to help resolve complex production problems. An additional benefit would be the increased future employers in the province.

Please feel free to contact me if I can be of assistance.

J.A. Chesterfield
Plant Manager
/mpf

APPENDIX 5

FEDERAL INDUSTRIES

WILLIAM E. WATCHORN
Vice-President

January 23, 1986

Mr. L. M. Wedepohl
Chairman, Implementation Team
Science Place Canada
Suite 307 - 155 Carlton Street
Winnipeg, Manitoba
R3C 3H8

Dear Mr. Wedepohl,

On behalf of Federal Industries Ltd. I would like to express our enthusiastic endorsement for the establishment of a Canadian Institute of Industrial Technology at Science Place Canada.

We believe that such an institution where small and medium size businesses would have ready access to sources of applied technology information and training is of critical importance in today's very competitive business environment. We also believe that locating such a facility in Winnipeg will reinforce the significant manufacturing base here and in the other western provinces.

I also concur with your financing proposal for this undertaking. At least initially sponsorship of the proposal should be undertaken by the provincial and federal governments but I am confident that income from the use of such a facility by business will increase significantly as businessmen become aware of the benefits of utilizing the resources that will be made available.

I would like to express my appreciation to you and your associates for having developed a proposal that I believe is both pragmatic in its design and therefore I believe has a much greater chance of success and in its obvious long term benefit to Canadian industry.

Yours sincerely,

William E. Watchorn
Vice-President

WEW/sw

Winnipeg Manitoba R3B 0C2

CP Rail

C R Pike
Vice-president

F S Baker
Administrative
Assistant to Vice-president

January 15, 1986

Our File
Your File

Dr. L. M. Wedepohl, Chairman,
Implementation Team,
Science Place Canada,
Suite 307 - 155 Carlton Street,
WINNIPEG, Manitoba.
R3C 3H8

Dear Dr. Wedepohl:

The establishment of a new technology centre at Science Place Canada in Winnipeg should be of considerable interest to railways in general and CP Rail in particular.

CP Rail has a need today for the research development of high technology tooling for microelectronic training and trouble-shooting, and in due course, as owners representative for the quality testing and acceptance of newly manufactured high technology products to performance specifications.

As a hub of rail operations, it would seem to make good sense that such resources be available in Manitoba.

The efforts being made by your team are indeed appreciated and we are hopeful Science Place Canada can play a significant role in the development of new and applied technology to the benefit of Canada.

Yours very truly,

Vice-President.