Deloitte Haskins+Sells

CANADA/NOVA SCOTIA

FINAL EVALUATION OF THE

ADVANCED MANUFACTURING SUPPORT SUBSIDIARY AGREEMENT

1985-1988

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November 30, 1988

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Dear John:

FINAL EVALUATION OF THE CANADA/NOVA SCOTIA ADVANCED MANUFACTURING SUPPORT SUBSIDIARY AGREEMENT

Please find enclosed 30 copies of our final report on the evaluation of the above mentioned Subsidiary Agreement.

Our study team has enjoyed working with you on this assignment.

Yours very truly,
DELOITTE HASKINS & SELLS

Gary B.M. Armstrong
Managing Partner

Enclosure

CANADA/NOVA SCOTIA

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Prepared by
Deloitte Haskins & Sells
November, 1988

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Haskins+Sells

PREFACE

The Final Evaluation of the Canada-Nova Scotia Advanced Manufacturing Subsidiary Agreement was conducted by Deloitte Haskins & Sells under the direction of an Advisory Committee. The Committee consisted of representatives of the Department of Regional Industrial Expansion and the Nova Scotia Department of Industry Trade and Technology.

Halifax, Nova Scotia
November, 1988

Deloitte
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CANADA/NOVA SCOTIA

FINAL EVALUATION OF THE

CANADA/NOVA SCOTIA ADVANCED MANUFACTURING SUPPORT SUBSIDIARY AGREEMENT

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CANADA/NOVA SCOTIA
EVALUATION OF THE
ADVANCED MANUFACTURING SUPPORT SUBSIDIARY AGREEMENT

1.0 INTRODUCTION

1.1 Evaluation Rationale

The Advanced Manufacturing Support Subsidiary Agreement (AMSA), 1985-1988, was an agreement between the Governments of Canada represented by the Department of Regional Industrial Expansion (DRIE) and Nova Scotia represented by the Department of Development to cooperatively promote growth and diversification of the Nova Scotia economy. The objectives of the AMSA were to support the development of new employment opportunities in the high technology sector and to accelerate the adoption of new technologies. The initiative was implemented under the umbrella of the Canada/Nova Scotia Economic and Regional Development Agreement (ERDA).

The Agreement requires that Canada and the Province shall jointly effect an assessment of the two programs initiated under this Sub-agreement. In accordance with Section 12.1 of the Agreement, the evaluation will assess the programs with regard to the stated objectives and provide an evaluation of the Agreement with respect to the general economic and socio-economic development of Nova Scotia.

This ex-poste evaluation study will serve as a management tool by providing information for management decisions to assist in future program planning.

Deloitte Haskins & Sells has been contracted by the two governments to conduct the evaluation.

It should be noted that since the signing of the AMSA, the Department of Development has been renamed the Department of Industry, Trade and Technology (DITT) and hereafter, will be referred to by its new name.

A profile of the AMSA documenting its background and structure is presented in the next section.

2.0 PROFILE OF THE SUB-AGREEMENT

2.1 Background

A number of factors contributed to the development of the AMSA.

The 1984 Canada/Nova Scotia ERDA defines a strategy in which the acceleration of adoption of new technologies and the development of skilled human resources are critical factors in the future economic development of the Province[1]. This theme was also pursued in the 1984 Nova Scotia White Paper on Economic Development which emphasized a development policy that encourages technological innovation by firms to improve competitiveness. Additionally, it recommended that the government and private sector develop appropriate training programs[2].

In 1981, the Halifax County Industrial Commission (HCIC) decided to assemble land in preparation for the development of an Aerotech Business Park adjacent to the Halifax International Airport[3].

On January 17, 1985, Pratt & Whitney (Canada) Inc. (P&WC) announced its intention to establish an advanced manufacturing facility in

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[1]Canada/Nova Scotia: Economic and Regional Development Agreement. pp. 3 and 4, Schedule A.

[2]Government of Nova Scotia: Department of Development, Building Competitiveness. A White Paper on Economic Development. 1984. pp. 19, 21, and 34. Hereafter see Nova Scotia. White Paper. 1984.

[3]UMA Group. Aerotech Business Park. Conceptual Planning and Preliminary Engineering Report. 1984, p.1.

the Aerotech Business Park proposed by the HCIC. In light of this announcement, DRIE was asked to reconsider its earlier rejection of an application by HCIC (June 1984) for financial assistance for an Aerotech Business Park. The Pratt and Whitney Canada announcement gave impetus to the Province's recognized need for developing human resources with high technology skills. Given changes in DRIE's Industrial and Regional Development Program, which meant the project was no longer eligible under IRDP, it was established that projects would be pursued under an ERDA Sub-agreement.

2.2 Mandate

The Economic and Regional Development Agreement (ERDA) was signed on June 11, 1984 by the Government of Canada and the Government of Nova Scotia. The purpose of the Agreement is to enhance the regional and economic development of the province. Under the umbrella of ERDA, the two levels of government entered into a number of subsidiary agreements, one of which was the Subsidiary Agreement on Advanced Manufacturing Support (AMSA) dated October 9, 1985.

As stated in the Sub-agreement, the Minister of the Department of Regional Industrial Expansion (DRIE) was authorized by the Governor in Council, by Order in Council P.C. 1985-3009 on October 4, 1985 to execute the AMSA on behalf of Canada. The Minister of the Department of Industry, Trade and Technology (DITT) was authorized by the Governor in Council, by Order in Council P.C. 84-638 on May 31, 1984 to execute AMSA on behalf of the Province. The agreement was made retroactive to January 1, 1985 and expired on March 31, 1988.

The AMSA was designed to further the objectives of ERDA and specifically to promote the "modernization and revitalization of

the industrial base through the application of advanced technology"[4].

2.3 Objectives

The objectives of the AMSA were:

(a) "to support the development of new employment opportunities in Nova Scotia in the advanced technology sector; and

(b) to accelerate the adoption of new technologies through human resource development"[5].

2.4 Elements and Structure

The causal relationships assumed to exist amongst the AMSA's programs, activities, outputs and impacts/effects have been summarized in a chart in the Evaluation Assessment (April, 1988) which is reproduced in Figure 1.

The causal model for the AMSA involved three programs: an Aerotech Business Park; a Technology Training Facility; and Public Information and Evaluation. The programs are described in the following section. These programs necessitated the activities of assessing proposed projects and funding requirements and secondly, devising and implementing public information and evaluation activities.

The outputs to be generated by these activities were financial assistance for advanced manufacturing and technical training, financial assistance for the Aerotech Business Park, and public information and evaluation studies/projects. These outputs were directly controlled by the Sub-agreement personnel.

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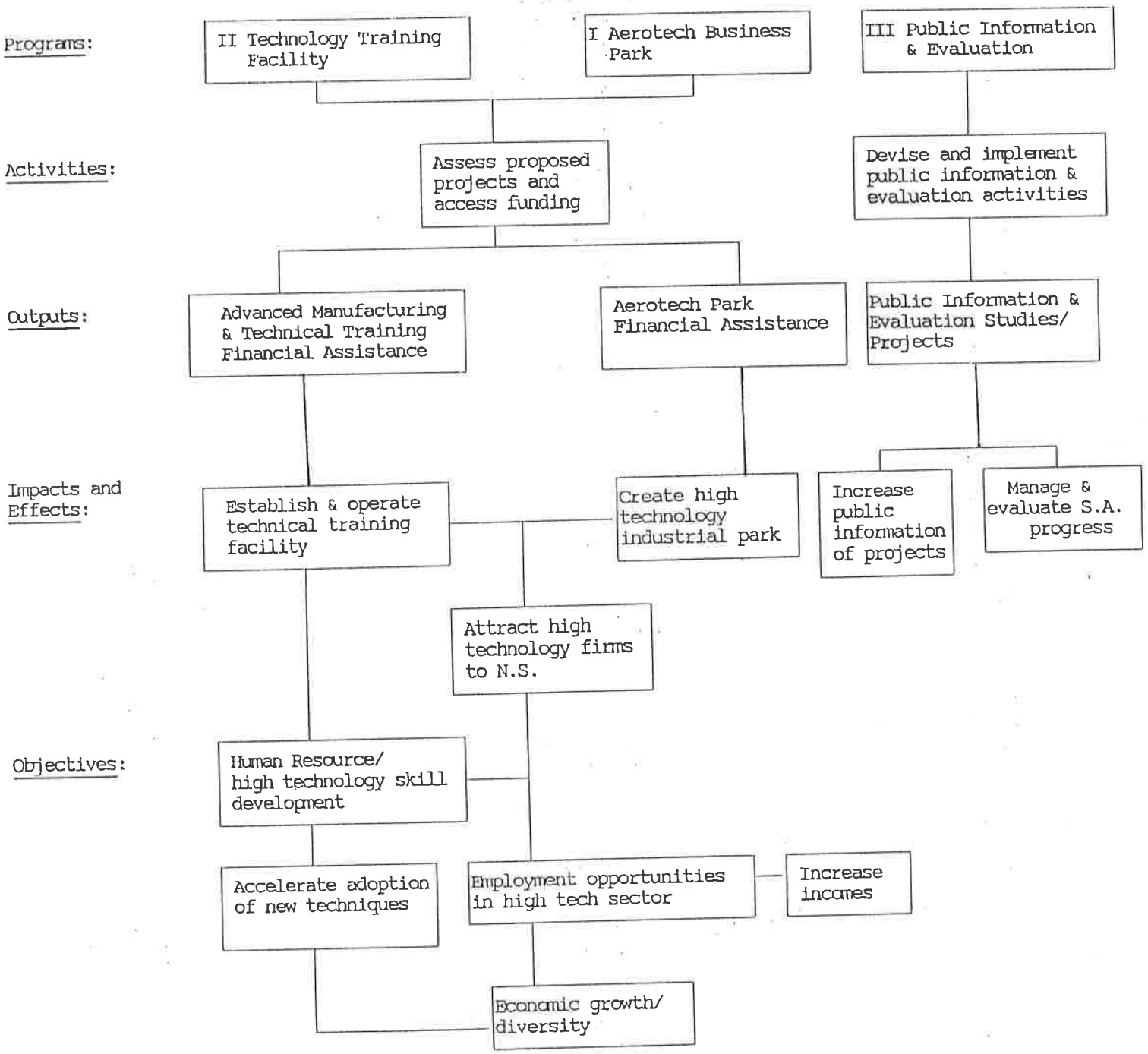
[4]Canada/Nova Scotia. Advanced Manufacturing Support Subsidiary Agreement, p. 1. Hereafter see AMSA.

[5]Ibid, Section 2.2, p.4.

CAUSAL MODEL ADVANCED MANUFACTURING SUBSIDIARY



Source: Evaluation Assessment. Advanced Manufacturing Subsidiary Agreement Draft #4.

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These outputs were expected to have certain impacts and effects which were: the establishment and operation of a technical training facility; creation of a high technology industrial park; increased public awareness of the projects; and management and evaluation of the Sub-agreement's progress.

These impacts and effects were expected to attract high technology firms to Nova Scotia and develop a supply of human resources with high technology skills. Thereby, the objectives of accelerated adoption of new techniques and development of employment opportunities in the high technology sector would be attained. Meeting these objectives was expected to achieve the goals of increased incomes and greater economic growth and diversity of the Nova Scotian economy.

2.5 Administration, Management and Financial Provisions

A Management Committee consisting of an equal number of representatives from DRIE and DITT designated by their respective Ministers was responsible for the administration of the AMSA[6]. The Management Committee was responsible for overseeing the planning and implementation of the programs outlined in the previous sub-section and for fulfilling the responsibilities identified in the Sub-agreement. The respective responsibilities of DRIE, DITT and HCIC, under the direction of the Management Committee along with financial provisions are briefly outlined in the subsequent paragraphs.

According to the Sub-agreement, the total cost of the AMSA was not to exceed $31,100,000. Funding for AMSA was on a cost-shared basis. The details of the distribution of the expenditures for the various programs are presented in Table 1.

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[6]AMSA. Section 5.3, p.6.

Table 1

Summary of Costs ($000's)
Canada - Nova Scotia Subsidiary Agreement
Advanced Manufacturing Support

Program	Estimated Cost	Federal	Provincial	Other*	Cost Sharing
I. Aerotech Business Park	20,000	15,000	-	5,000	75:0:25
II. Technological Training Facility					
(a) Building & Equip.	9,500	6,650	2,850	-	70:30:0
(b) Hardware Maintenance and Software Support	1,500	-	1,500	-	0:100:0
III. Evaluation and Public Information	100	70	30	-	70:30:0
TOTALS	31,100	21,720	4,380	5,000	70:14:16

*Municipality of the County of Halifax

Source: Canada/Nova Scotia: Advanced Manufacturing Support Subsidiary Agreement, Schedule A.

Program I: Aerotech Business Park

Program I was to be implemented by the HCIC, an agency of the Municipality of the County of Halifax. It was to be administered jointly by the County and DRIE with participation from Environment Canada[7]. The Aerotech Business Park was to be owned and operated by the HCIC. The estimated cost was $20 million, shared by the Federal Government and the County of Halifax on a 75 percent and 25 percent basis respectively.

Program II: Technological Training Facility

(a) Building and Equipment

The building and equipment for high technology skills training was to be operated by the Nova Scotia Institute of Technology (NSIT)[8]. This project was to be implemented by the Province and administered by a team of representatives from DRIE and DITT. Coordination was to be maintained with the Department of Education and Pratt & Whitney Canada.

The building and equipment component was estimated to cost $9.5 million, with the Federal and Provincial Governments' shares being 70 percent and 30 percent respectively.

(b) Hardware Maintenance and Software Support

This project was to be implemented and administered by the Province.

This program was estimated to cost $1.5 million to be covered entirely by the Provincial Government.

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[7]DRIE. Advance Manufacturing Support Subsidiary Agreement. Files.

[8]AMSA, p.2.

Program III: Evaluation and Public Information

This program was to be implemented by the Province and jointly administered by DRIE and the Province.

It was estimated to cost $100,000 which was to be shared by the Federal and Provincial Governments on a 70 percent and 30 percent basis respectively.

Amendments to these financial provisions were allowed with the agreement of both Ministers. Although amendments to the objectives and total cost may have required the approval of the Governor in Council, the Management Committee was permitted to make adjustments in the programs as long as they did not increase the total cost of each program.

Details of the contract and payment procedures are listed in the Sub-agreement along with the requirements for records, audits and monitoring.

2.6 Progress and Current Status

The AMSA, although signed on October 9, 1985, was made retroactive to January 1, 1985 and expired March 31, 1988.

The first meeting of the Management Committee was held March 11, 1986, at which time a contract between the County of Halifax and HCIC and DRIE (dated November 7, 1985) and a Project Authorization (dated March 11, 1986) to provide funding for Phase I of the development of the Park were approved. The Management Committee also approved a Project Brief (January 27, 1986) and a Project Authorization (March 11, 1986) to provide facilities and equipment required for high technological skills training.

The second meeting of the Management Committee was held on July 17, 1986. It was recorded in the minutes that the County had completed 50% of the project and was expecting to complete Phase I during

that fiscal year. At this time, approximately $8.2 million had been paid out and established as payable. With regard to the Technological Training Facility it was reported that all costs were expected to be claimed during the fiscal year.

The third meeting was held November 6, 1987. The Management Committee approved a revised Project Brief for the Technological Training Facility. The original total cost of the building and equipment project of $9.5 million was allocated as follows: $2,537,225.71 for the building and $6,962,274.29 for equipment.

The Committee also approved a Project Authorization and Brief for evaluation and public information. The total cost was set out at $56,000 of which 70% was to be provided by DRIE and 30% by DITT.

The Evaluation Project Team was authorized by the Committee to proceed with the request for proposals for the evaluation assessment.

The Management Committee advised that both the Aerotech Business Park and Technological Training Facility were 100 percent complete.

The monthly financial status report indicated that as of October 31, 1987, federal monies for the Aerotech Business Park and building and equipment for the Training Facility had been almost completely expended. The money allocated for evaluation and public information remained unallocated[9].

3.0 EVALUATION ISSUES

3.1 Identification and Selection of Issues

A comprehensive set of issues was identified in the Evaluation Assessment Report (April, 1988) prepared by Deloitte Haskins & Sells. The issues were developed based upon the Consultant's

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[9]DRIE. Financial Status Report. October 31, 1987.

previous experience with evaluation studies, a review of the AMSA file made available by DRIE, the Draft Evaluation Assessment (March 1987) prepared by representatives of DRIE and DITT, and the Treasury Board Guide to the Program Evaluation Function. Discussions with program administrators at DRIE, DITT and HCIC as well as with the principal of NSIT assisted in formulating the set of relevant issues.

The report was submitted to the Advisory Committee and approved on May 6, 1988. The final approved issues and the priority attached to each is presented in Table 2.

4.0 EVALUATION METHODOLOGY

In order to assess each of the issues, data has been collected from three sources: a document and literature review, interviews and surveys. The data requirements and sources associated with each issue are summarized in Appendix A.

4.1 Document and Literature Review

A literature review to develop an assessment of the general socio-economic and policy environment prior to and during the AMSA was undertaken. A list of the documents reviewed is provided in Appendix B.

4.2 Interviews

Personal interviews were conducted with selected representatives of four groups:

(a) Program administrators - DRIE and DITT;

(b) Knowledgeable observers;

(c) Sub-agreement participants - NSIT, Department of Education, and HCIC; and

(d) Park firms - P&WC, and Litton Systems.

Table 2

Ranking of Evaluation Issues

Advanced Manufacturing Support Subsidiary Agreement

Essential Issues	Desirable Issues	Optional Issues
1.0 RATIONALE		
1.1 High Tech Orientation	1.3 Relationship with ERDA	
1.2 Strategy		
2.0 OBJECTIVES ACHIEVEMENT		
2.2 Employment Opportunities	2.3 Technology Adoption	2.1 Evaluability
2.4 Economic Impact		
3.0 IMPACTS AND EFFECTS		
3.1 Technical Training Facility	3.3 Firms Attracted	3.4 Public Information
3.2 High Tech Business Park		
4.0 ALTERNATIVES		
4.2 Efficiency	4.1 Implementation	
	4.3 Implications	

Given the special expertise of representatives of each group and differences in their involvement with the AMSA, separate interview guides were developed for each group. The interview guides are presented in Appendix C. The people contacted are listed in Appendix D.

4.3 Surveys

Two surveys were conducted, one with Automated Manufacturing Technology Center (AMTC) graduates, and the second with high technology firms not located in the Park.

The Consultant conducted a survey of the AMTC graduates by telephone. The list of graduates was provided by NSIT. Interviews were conducted with 12 graduates. In order to conduct the 12 interviews, the Consultant tried to contact 28 people. Of the total number of attempts, 1 person had moved, 1 person did not want to participate, 2 people had moved out of the Province and 5 telephone numbers had been disconnected and did not have new numbers and in 7 cases the phone was never answered. The questionnaire used in the survey is presented in Appendix C.

A mail survey was conducted of high technology firms. A copy of the questionnaire and a letter explaining the purpose of the survey was sent to 25 firms (Appendix F). The response rate was 40 percent. The sample was drawn from firms previously contacted by Underwood McClellan for the pre-feasibility study of the Aerotech Business Park [10].

5.0 EVALUATION RESULTS AND CONCLUSIONS

The following sections address each of the evaluation issues and questions under the headings of:

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[10] UMA Group. Aerotech Business Park: Market Feasibility Study. Prepared for N.S. Department of Development and DRIE. February 1983.

. Rationale;

. Objectives Achievement;

. Impacts and Effects; and

. Alternatives

Under each heading, the question is presented followed by a review of relevant findings and conclusions.

5.1 Rationale

Issue 1.1 High Tech Orientation

Given the social, political and economic environment in Nova Scotia at the time, was it appropriate to have a sub-agreement with a high technology orientation?

Globally, the manufacturing process is being revolutionized by recent high technology developments. Components of the high technology sector such as computers, microprocessing, telecommunications and information dissemination are being combined to automate the production process. The advanced manufacturing system based upon electronics is not simply the result of further automation of the existing mechanical production process, but an entirely new method of production. In fact, the impact of these technological developments on the economy is anticipated to be of the same magnitude as the Industrial Revolution. The characteristics of the advanced manufacturing system include flexibility of production resulting in reduced importance of economies of scale, greater speed, machine intelligence and the integration of technologies[11]. To attain business competitiveness in the future will require increases in productivity and product quality through the creation and application of high technology.

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[11]National Science Foundation. "Factories of the Future: Defining the Target" referred to in DRIE. Innovations, Fall 1986.

The global trends in manufacturing production processes have implications for the economy of Nova Scotia. The economy of Nova Scotia is dominated by primary production (agriculture, fishing, forestry and mining). The manufacturing sector in Nova Scotia accounts for only 13 percent of total employment compared to 18 percent for the country as a whole[12]. Within the manufacturing sector, 30 percent of employment and 21 percent of value of shipments were derived from fish, pulp and paper and dairy products. The technological developments pose a challenge to the existing manufacturing sector which will need to innovate in order to maintain business competitiveness. However, the advanced manufacturing systems also offer the potential to assist in the diversification of the economy away from low value added, resource based processing.

To advance economic development in the province of Nova Scotia, the Provincial Government, as indicated by the 1984 White Paper, proposed to enhance the competitiveness of the private sector[13]. Technological innovation was identified as a key factor to be addressed by economic development policy for the remainder of the 1980s. The Government of Nova Scotia's aim was to assist firms and individuals to increase their competitive ability and performance through actions to strengthen human resources and to improve the business environment[14].

With respect to unstated objectives or modifications to the original objectives during the course of the Sub-agreement, there appears to have been very little variance from the

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[12]Statistics Canada. Catalogue 31-203.

[13]Nova Scotia. A White Paper on Economic Development, 1984.

[14]Ibid, p.8.

original direction of the objectives. That is, the Agreement was specifically designed to stimulate the infrastructure development of the Aerotech Business Park and the establishment of AMTC.

On a global scale, high technology developments have revolutionized the manufacturing process resulting in productivity gains and improvements in productivity and product quality. The provincial strategy for economic development as indicated by the 1984 White Paper, emphasizes technology as a key element in "building competitiveness". Given the goals of economic growth and diversification and the economic and political situation at the time, it was appropriate to have a sub-agreement with a high technology orientation. The objectives do not appear to have been modified during the implementation of AMSA.

Issue 1.2 Strategy

Was the strategy of AMSA appropriate to stimulate job creation and social and economic development?

The AMSA was designed to create economic growth and diversity through the stimulation of the high technology sector. While the overall high technology orientation was concluded to be appropriate as noted above, the logic of the strategy is evaluated below.

The strategy is comprised of two main components, an Advanced Manufacturing Technical Training Facility and a Technological Business Park. Elements of the strategy and causal relationship have been described in Section 2.4. The importance of an appropriately skilled labour force to attract high technology firms, and thereby, stimulate growth of the high technology sector is now well-documented. While high technology firms make location decisions on the basis of similar factors as traditional

manufacturing firms, the availability of a skilled technical labour force is considered to be relatively more important[15]. The survey of high technology firms, undertaken by the Consultant supports this hypothesis and the majority of respondents reported that the availability of an appropriately skilled technical labour force was a key feature affecting their location decisions.

The availability of a skilled technical labour force to attract high technology firms is also recognized in the provincial framework for economic development[16]. Furthermore, it is noted that there is a short supply of "advanced skills in product fabrication, machinery and certain engineering occupations" and an increasing demand for "highly skilled professionals, technologists and technicians".

With regard to the second component, a high technology business park, it appears from the literature that the environment is also a critical factor influencing the location decisions of high technology firms. High technology firms seek locations with a good transportation network, an attractive physical environment, an environment supportive to production including advanced laboratories, testing facilities, technical expertise within the community and a clustering of complementary enterprises. The development of land close to the airport was a strategy which appears to take account of the special characteristics of a location demanded by high technology firms. Proximity to an airport was considered to be an important factor influencing location

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[15]Area Development, September 1984 and Development Magazine, December 1987. An example of this point is given by the Senior Vice President for IMP who stated that "the market opportunities in the aeronautical field are enormous .... They are limited only by the people we can hire " [DRIE. Innovations.Vol. 2, No. 2, Jan. 1988, p. 7].

[16]Nova Scotia. White Paper. 1984.

decisions of a number of firms participating in the survey. No respondents indicated having immediate plans to relocate to Nova Scotia. However, several respondents stated Nova Scotia would be considered as a location for establishing an additional plant in order to meet the concerns of regional development and to be eligible for government assistance programs. However, a strategy for developing the supportive infrastructure, (including linkages to the wider economy, industry-university linkages and linkages to the financial sector), which has been documented as a key determinant of park viability was not specified in the Sub-agreement.

The creation of a high technology park is complementary to other programs. The Province has taken other initiatives in the high technology sector such as the Nova Scotia Research Foundation Corporation, Computer Aided Design Centre at the Technical University of Nova Scotia, and the Sub-agreement on Technical Transfer and Industrial Innovation.

Thus the logic of the strategy identified by the AMSA itself is appropriate. However, it must also be assessed in light of other strategies in place at the time. This is of particular concern for the Aerotech Business Park. Financing to assist in the development of a park was made available based upon the logic of having a lead tenant, which would assist in attracting other firms. Thereby, the Park would have a greater probability of success. This lead tenant was known to be P&WC. Prior to this time, the Federal Government also had agreements with P&WC. A number of Memoranda of Understandings (MOUs) had been agreed to by P&WC and the Federal Government. Key areas agreed to by both parties included product mandate and autonomy, training, technology transfer and sub-contractor development. In addition, P&WC received assistance for design and equipment costs through DIPP contracts. It is also understood by the Consultant that P&WC, in order to meet the

requirements of the MOUs, planned to build a new plant either west of Ontario or east of Quebec. P&WC agreed to locate in Nova Scotia provided the Aerotech Business Park could be established as conceptualized. In effect, the AMSA was designed to assist HCIC to establish the Aerotech Business Park rather than being devised to directly assist P&WC. In addition, P&WC also participated in the development of the curriculum of the AMTC and hired the majority of the graduates. The Provincial Government also entered into agreements with P&WC (and Litton Systems) relating to industrial development in the Province. As such the AMSA could be considered as reacting to a defined opportunity.

The assessment of the logic of the strategy depends upon whether a short run or long run perspective is adopted. In the short run, the economic benefits to the Province will essentially be those generated by the production of P&WC and Litton Systems. As these economic benefits must be related to the combined cost of all programs, the net economic benefit is likely to be minimal. Secondly, it may be logical to have a lead tenant and there is nothing inherently inefficient about providing additional incentives to attract that tenant.

However, as in all cases, potential duplication of programs must be assessed. This occurs when a number of policy instruments are being used to pursue the same objectives. If in the long run, no other firms are attracted then the result is similar to the short run. If other firms are attracted in the long run, in accordance with the strategy identified by the AMSA, then the funds disbursed for the Business Park will generate greater economic benefits. Additionally, as the number of firms increase, the extent of any duplication of effort in the initial instance in attracting P&WC decreases.

The timing, level of effort and level of funding were sufficient to establish the infrastructure for the Park and for the AMTC addition to NSIT. However, to keep the AMTC facility up-to-date will require the availability of on-going funding (see also the discussion of issue 3.1). It is too early to assess the response to the strategy from industry and the ultimate development of a Nova Scotia high-technology sector as a direct result of the AMSA.

The causal relationship between establishing a technical training facility and a high technology industrial park and achieving the objectives of new employment opportunities in the high technology sector and accelerating the adoption of technology is logical. However, achievement of the two objectives will require a long term commitment. Clearly though, both components of the strategy are clearly only part of an overall strategy to promote the advanced technology sector of the economy and linkages to these other components must be supported.

Issue 1.3 Relationship with ERDA

Does AMSA flow naturally from the objectives and strategies explicit and implicit in the ERDA?

The ERDA was signed on June 11, 1984 by the Government of Canada and the Government of Nova Scotia. The general purpose of the Agreement was to enhance the regional and economic development of the Province. The major objectives of this Agreement were as follows:

(a) to enhance the economic development of Nova Scotia throughout all areas of the Province;

(b) to maintain and expand stable, long-term employment opportunities and to increase real levels of earned income for Nova Scotians;

(c) to maximize on an equitable basis for Nova Scotians the permanent net benefits from the indigenous natural resources of the Province;

(d) to promote provincial economic growth in a manner supportive of the social and cultural well-being of its people;

(e) to improve joint consultation and coordination between the two Governments on a wide range of matters pertaining to the health and growth of the Nova Scotian economy; and

(f) to assist Nova Scotia to maximize its contribution to the long-term growth and development of the national economy[17].

The two Governments developed the ERDA based upon a common understanding of the medium term priorities for the economic development of the Province. The strategic priorities identified in 1984 included the overall objective of increasing productivity and capacity to compete. The attainment of this objective was perceived to be dependent on technological transfer and innovation, human resource development and capital investment. The sectoral priorities included the off-shore oil and gas, resources, manufacturing and service sectors. Within the manufacturing sector, the need to accelerate the adoption of new technology was specifically mentioned.

The Agreement identified two instruments to achieve the stated objectives, namely subsidiary agreements and memoranda of understandings (MOU). The AMSA is one such sub-agreement.

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[17]Canada/Nova Scotia. Economic and Regional Development Agreement. Section 3.1, p.3.

The objectives of the AMSA were to:

a) "support the development of new employment opportunities in Nova Scotia in the advanced technology sector"; and

b) "accelerate the adoption of new technologies through human resource development"[18].

The use of a sub-agreement as a vehicle and the objectives of AMSA are in accordance with the instruments, objectives and strategic priorities specified in the ERDA.

5.2 Objectives Achievement

Issue 2.1 Evaluability

Were indicators of objectives achievement specified in the AMSA?

In order to evaluate the degree of attainment of objectives, it is necessary that project documents establish measurable indicators or targets for objectives. As noted previously, the two main objectives of the AMSA were to create employment opportunities in the high technology sector and accelerate the adoption of new technologies through human resource development. For example, with regard to employment opportunities, it would have been possible to specify the number of jobs to be directly created in the high technology sector over a specified period of time. The task of specifying verifiable indicators of technology adoption is substantially more difficult as there are no easily quantifiable indicators.

From a review of the AMSA document and working paper files, targets for employment creation and technology adoption do not appear to have been specified.

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[18] AMSA, Section 2.3, p. 4.

Measurable indicators of the AMSA were not specified and therefore, it is not possible to evaluate the progress in achieving objectives in terms of targets specified in the AMSA. Targets should be specified in sub-agreements to provide a benchmark against which to evaluate success.

Issue 2.2: Employment Opportunities

Has AMSA stimulated net new employment for Nova Scotians?

Employment opportunities have been created directly and indirectly as a result of implementing the AMSA. There are two firms that have established production facilities in the Park and have started production. A total of 300 jobs have been created at the Aerotech Business Park directly as a result, P&WC (119 jobs) and Litton Systems (183 jobs). The majority of the positions were filled by residents of Nova Scotia (almost 100 percent at P&WC and 70 percent at Litton Systems). However, not all of these jobs can be considered to be high technology jobs. For example, at Litton Systems, while employees are assisted by high technology, they are performing essentially assembly line tasks. There is some indication, based upon the survey of AMTC graduates that the growth of high technology employment opportunities has been slower than the growth of graduates of AMTC resulting in some graduates moving out of the province in search of employment.

The average annual salary is reported to be $35,000 (plus 25% benefits) at P&WC[19]. However, the recent graduates of the AMTC program indicate that their annual incomes are considerably lower than the average[20].

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[19]Interview with a representative of P&WC, September, 1988

[20]Results from the survey indicated that their incomes fall within the range of $20,000 to $30,000.

Furthermore, not all of these jobs can be attributed totally to the AMSA given that other programs were instrumental in determining the decisions of P&WC and Litton Systems to locate in Nova Scotia. For a further discussion of this point, refer to Issue 1.2.

Additional employment opportunities will be created by the two firms located in the Park in the future. Over the next 3 to 4 years, P&WC plans to reach full production which will involve the employment of 500 people. By 1994, Litton Systems plans to employ in excess of 400 people.

Other employment opportunities have been provided as a result of the AMSA. Construction jobs were created during the construction of the P&WC, Litton Systems and AMTC facilities. Construction of the Litton Systems' facility was reported to be undertaken entirely by Nova Scotia based companies.

In addition, it is probable that employment opportunities have been created indirectly through the AMSA in the service and trade sectors and other firms in the manufacturing sector. Purchases of local goods and services by the two firms located in the Park amount to about $ 700,000 annually.

In the long run, it will remain difficult to assess job creation as the result of AMSA for two reasons. First, it will be difficult to attribute all changes in the number of high technology jobs specifically to the AMSA as opposed to other government action in the high technology sector and general economic trends, particularly for those jobs located outside of the Park. Second, the data categories used by Statistics Canada to classify jobs do not allow one to distinguish the high technology jobs from other jobs.

As it is only a few months after the completion of the AMSA, it is too early to pass final judgement on its success in

creating high technology employment opportunities. Experience from elsewhere indicates that to create a thriving industrial park, long term commitment is required. For example, Burnside Industrial Park required 10 to 15 years to become established.

New jobs were also created at the AMTC in the form of six instructor positions and one secretarial position which was transferred from NSIT. Continued employment and growth depends on the growth of the local high technology industry and subsequent demand for AMTC graduates.

The new employment created is summarized in Table 3 below.

Table 3

Net New Employment Created Directly by AMSA, September, 1988

Firm	Present Employment	% Nova Scotian	Planned Employment (year 1994)
P&WC	119	98	500
LSC	183	70	400
AMTC	7	100	7
Total	309	-	907

Source: Interviews with representatives of P&WC, Litton Systems Canada (LSC) and NSIT.

The Sub-agreement has created about 300 new employment opportunities in the advanced technology sector, although it is doubtful that all are high technology jobs. Expansion of employment apportunities is expected over the next 5 years.

Issue 2.3 Technology Adoption

Has new technology been adopted?

As a result of the AMSA, two high technology firms are now located in the Province. The concept and measurement of "advanced technology" is complex which is well illustrated by the differences between the first two firms to establish plants in the Park. Litton Systems produces "high technology" products using a traditional manufacturing process, albeit with automated assistance. On the other hand, P&WC produces aircraft engine components which are not themselves "high technology" products, but uses an advanced manufacturing production process.

The impact of the AMSA on the adoption of high technology by firms located outside of the Park is more difficult to assess. However, based upon the results of the interviews conducted during the evaluation study, it is possible to indirectly comment upon this issue. For example, several machining and metal manufacturing companies in Nova Scotia have already sent staff or have expressed interest in sending staff, for skills upgrading at the AMTC. Also, P&WC is interested in sub-contracting out which will provide additional demand for small firms' products. This will then create an incentive for firms to undertake investment in technology.

Advanced manufacturing technology is being used by the two firms located in the Aerotech Business Park and by a few other firms in Nova Scotia. However, the process of advanced manufacturing technology has not yet been widely adopted in the Province. The new technology created will likely be that which the firms that locate in the Park bring with them. Ultimately contracting out by these firms will stimulate technology adoption by local firms.

Issue 2.4: Economic Impact

What has been the economic impact of AMSA?

The impact of the AMSA on the Provincial economy is evaluated by using an illustration of the multiplier effect of the annual production of one firm located in the Park and by drawing inferences about the consequences over the long term of such production and the increased number of firms locating in Nova Scotia. The input-output model enables the estimation of the total multiplied impact on the Provincial economy resulting from a firm's annual production. The model is comprised of a set of input-output relationships characteristic of firms in a variety of industries. The economic impact of P&WC was assessed using DITT's provincial (1979) 64 sector input-output model. It is assumed that P&WC is part of the Aerospace industry. This is appropriate given that P&WC produces aircraft engine parts and that the ratio of the value of output to wage bill for P&WC ($4.7 million) is similar to the ratio for the industry as a whole. Given P&WC's projection of its 1988 production, the impact on the economy is estimated to be between $7 and $8 million in 1988. This is less than 0.1 percent of the Province's GRDP.

The impact of the AMSA on the economy must be qualified as follows:

(a) the economic impact of P&WC will increase over the next few years as the firm reaches full production. At present the firm is in a tool-proofing stage and is only at 10% of capacity;

(b) the multiplier effect of production of P&WC, as for other similar firms, is small given the relatively small amount of local purchases made by P&WC;

(c) the economic impact of the AMSA will increase substantially in the long run, as new firms are attracted to the Province and commence production; and

(d) the net economic benefit of the AMSA is reduced if one takes into account the fact that a number of programs contributed towards the attraction of P&WC to the Aerotech Business Park, as discussed in Issue 1.2. Such an assessment is not attempted here.

In addition, construction costs for facilities were $18.1 million for PW&C and $8 million for Litton Systems which would have had a multiplied economic impact on the economy.

The economic impact of the AMSA has been small relative to the costs to date. However, it is expected to be greater in the long run as existing Aerotech Business Park firms increase production and other firms are attracted to the Province.

5.3 Impacts and Effects

Issue 3.1 Technical Training Facility

Was a technological training facility established and was it operated according to the AMSA specifications?

The AMTC was officially opened in the spring of 1987. Based upon a review of the Project Brief, it appears that the floor area was revised upwards from the original AMSA specification. The intended completion date was the fall of 1986. Interviewees cited the following reasons for the delay:

- the technology was more sophisticated than anyone expected;
- the delivery of the equipment was behind schedule; and
- some degree of inefficiency resulted because one sub-contractor travelled between Boston and Halifax.

All persons interviewed appeared impressed with the quality of the hardware and software training facilities of the AMTC. It was pointed out that, although there are similar facilities in Canada, the AMTC is the only one to have a totally integrated range of training with robotics, guided vehicles and integrated software.

The program at AMTC commenced in 1986. Each year there are four rotations of 15 students. The rotation system was designed to relieve pressure on the various components of the facility. Enrollment was set at 60 students per year because it was felt this level could supply Pratt and Whitney's demand. Although the AMSA did not have specific job creation targets, Pratt and Whitney did, and therefore these levels were considered in determining the admissions limit. Also, NSIT and CEIC officials concluded there were sufficient qualified candidates available to fill 60 seats a year. Table 4 below summarizes the graduate statistics from AMTC.

Table 4

AMTC Graduates to August 1988

Intake	Registered	Graduated
1986/87		
1	15	15
2	15	14
3	16	11
4	15	15
1987/88		
5	15	n.a.
6	15	n.a.
7	15	n.a.
8	14	n.a.

Source: AMTC administrative records, 1988 (n.a.=information not yet available).

One of the objectives of the AMSA was not simply to create jobs but to create high technology and well paying employment opportunities in Nova Scotia. One interviewee has indicated that 95 percent of the graduates have found high technology jobs and 95% are employed in Nova Scotia. The average annual salary of recent graduates was reported to be in the $25,000-$35,000 range. The results of the survey of graduates suggest that the annual average salary is slightly lower and in the $20,000-$30,000 range. It is questionable whether all jobs created can be considered as high technology ones (see issue 2.2).

The automated manufacturing technology program complements other NSIT programs. Candidates must have some technical background and other courses offered by NSIT provide the necessary prerequisite training background. For example, the AMTC provides a post-graduate avenue for several other programs such as the Mechanical Engineering Technology Diploma and the Electronic Engineering Technology Diploma, other prerequisites include a university degree. Thus the program complements the professional designation courses offered by the Technical University of Nova Scotia. Details of the programs admission requirements and the course contents are provided in Appendix E. The facilities of the AMTC at NSIT are not yet used by other educational institutions in the surrounding area.

The type of skills training being provided by AMTC appears to be appropriate and in accordance with the AMSA[21]. The representative from P&WC interviewed, expressed satisfaction concerning the skills of the graduates of the AMTC program whom they have hired.

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[21]See Issue 4.3 for a further discussion of skills.

Comments of students of the AMTC who participated in the survey yield the following general points:

(a) the perceived strengths of the AMTC program are the computer and mechanical facilities;

(b) the weaknesses are considered to be the lack of direction provided, the type of evaluation scheme, the narrow focus of the program on machining, limited technical expertise of the staff; and

(c) lack of job prospects apart from the machine technologists demanded by P&WC which has resulted in some graduates having to move away from the province in order to find jobs.

During the course of the evaluation study, several issues emerged which have long run implications for the AMTC. First, the impact of the AMTC in the long run will depend on the ability of its management and the government to keep the facility up-to-date and responsive to the needs of industry. In addition, the AMTC will need to be appropriately marketed to the business community nation-wide[22]. Concern was expressed about the availability of on-going funding to maintain the program and ensure that equipment and software will be kept current. This is of particular importance given (a) the substantial costs associated with software maintenance[23] and (b) the pace at which software obsolescence occurs.

Second, it was suggested by some of the interviewees that while the existing training programs will be on-going, alternative programs

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[22]One interviewee, suggested that representatives of NSIT avail themselves of the marketing opportunities provided by attending a high technology trade show in Detroit.

[23]The offer of software maintenance was turned down in the contract for purchase of the software given its estimated cost of $18,000 per month.

be made available to accommodate a wider range of students. The course is now 46 weeks long and for various reasons excludes a number of qualified candidates, for example due to financial pressures and time constraints. It was suggested that mini-sessions of 2-3 weeks and day release programs would be very useful.

Third, the difficulty of hiring qualified personnel for the AMTC experienced at the opening of the facility may continue.

Fourth, the focus on machining may have to be widened. While it is often difficult to meet the expectations and needs of all students, greater variety in focus may become more feasible in the long run as P&WC demands for technologists is met and new fields of expertise are demanded. This may require not only broadening of the AMTC program but strengthening technical programs at other institutions.

Finally, the reduced financial support for students may severely limit the pool of qualified applicants. Initially, all students were sponsored by CEIC, however this support which is now being reduced could have an impact on the availability of qualified students. The majority of graduates surveyed stated they would not have been able to enroll in the program without the financial support (from CEIC or unemployment insurance benefits). This is further supported by the fact that there are only 8 students currently enrolled in the program and there are only 6 or 7 registrants anticipated at the next intake on October 31, 1988.

An advanced manufacturing technology centre was established at NSIT and has been operating since 1987. While the facilities are considered to be "state-of-the-art", some reservations were raised concerning the accompanying expertise. A number of long run implications for the facility have been noted above.

Issues 3.2 High Technology Business Park

Was a high technology business park created and operated according to the AMSA specifications?

The official opening of the Aerotech Business Park was October 20, 1987. The minutes of the AMSA Management Committee meeting dated November 6, 1987 stated that Phase One of the Park was 100 percent complete.

During the first phase, 498 acres were developed of which approximately one-third has been purchased. The land owned by area and use is summarized in Table 5. Two firms, P&WC and Litton Systems are located and operating in the Park; they have purchased 100 acres and 20 acres respectively. Three other firms have purchased land. Xcel Development owns 2.5 acres and has started construction of a facility. Transmetro and Davis Properties own 16 and 7 acres respectively. Both companies have building permits but are waiting for at least one tenant each before starting construction. In addition, the HCIC is currently negotiating with three high technology firms.

The cost of developing land is discussed under issue 4.2.

The design and philosophy of the Aerotech Business Park appear consistent with those of successful, high technology parks discussed in the literature. The Park has excellent transport links and the HCIC has emphasized creating an attractive, "campus-like setting". Entrance criteria have been set and management is taking its time to ensure development of a cluster of high technology firms. The HCIC plans to uphold a philosophy of flexibility in developing sites to meet tenant's

Table 5

Land Developed by Firm and Current Use,
Aerotech Business Park, Phase One, October, 1988

Firm	Area Owned	Current Status
P&WC	100.0	Operating
Litton Systems	20.0	Operating
Xcel Dev't	2.5	Construction
Transmetro	16.0	Building permit
Davis properties	7.0	and waiting for tenants
Total Purchased	145.5	
Total Developed	498	

Source: Aerotech Business Park, Director, Interview September, 1988.

individual site needs. Finally, there is a long term commitment to the development of the Park. In the long run, the ability of the Park to attract high technology firms and to generate the intended economic benefits, should be well-served by upholding these original intentions.

At present, the Park has strict entrance requirements to ensure conformity to its high technology target market. If the Park begins to relax its criteria, this will create competition amongst the existing parks. To this point, the entrance criteria have been adhered to and potential clients who did not meet the criteria have been rejected. However, it was suggested to the Consultant that if growth is slow and success is questionable, pressure will be exerted which could lead to an easing of the entrance criteria. If this were to happen, the Aerotech Business Park would eventually become a general industrial park.

There is a growing concern about conflict over land use in the area of the Aerotech Business Park. This area of the County has received a lot of attention in the past several years due to the availability of land and its close proximity to the metropolitan area. There is a great potential for development which must be carefully planned and monitored. The recently opened race track, "Scotia Speedworld", in the immediate area of the Park, is an example of this concern. The race track will create noise and traffic which may conflict with a "campus style" setting which the HCIC plans to attain. High technology companies tend to be image conscious, and controlling the use of surrounding land is critical. On the other hand, management of the race track believe their facility is complementary to the area. They agree land use planning is critical and want to see a coordinated and organized development of the surrounding area. They anticipate the land opposite the Aerotech Business Park will be earmarked for recreational facilities segregated from the Business Park by the Highway.

Finally, the plans of one recent purchaser of land in the Park to provide space to service firms will assist in strengthening the Park in terms of attracting businesses. The literature and results of interviews conducted indicate the importance of having commercial and service facilities appropriately located and in close proximity to the high technology firms. Examples of such facilities cited by interviewees include: banks, motels, conference facilities, restaurants, day care, recreational facilities and suppliers of inputs to production and office supplies.

Issue 3.3 Firms Attracted

Have high technology firms been attracted to Nova Scotia due to trained labour and the Aerotech Business Park?

At present, the two firms established in the Park, P&WC and Litton Systems Canada, can be described as having moved there as a result of the development of the Aerotech Business Park. In fact, P&WC stimulated the development of the Park and the AMTC.

Litton Systems, on the other hand, moved to Nova Scotia after originally chosing to locate in Prince Edward Island. Litton's presence in the Atlantic Provinces is to a large extent dictated as a condition of some defence contracts to have an Atlantic component. In regard to the AMTC, Litton does not have an automated manufacturing system such as that used at P&WC and generally provides staff training in-house.

The Aerotech Business Park is being actively marketed by the HCIC, and several prospects are exploring establishment in the Park. Two firms, Davis Properties Ltd. and Transmetro Properties have announced intentions to construct buildings in the Park in the near future. However, these are not high technology manufacturers but are developers with the former planning to establish an office complex and the latter planning a multi-purpose building with modules to be leased to high technology companies. Intentions are to begin construction once sufficient tenants have been committed.

Several of the high technology firms surveyed, indicated that they have no plans to relocate to Nova Scotia, however, they indicated that they might expand to the Province should business developments warrant. While these firms indicated that a trained high skilled labour force would be crucial to any relocation/expansion decision and that the Aerotech Business Park

would be an attractive location, these alone would not be sufficient reasons to move. In addition, a number of firms indicated that they use in-house training programs. However, it is of interest to note that during the pre-feasibility study conducted by Underwood McLellan, both P&WC and Litton said they were not interested in the Park at that time.

A high technology business park has been developed and is being operated by HCIC in accordance with the AMSA specifications. Approximately one-third of land developed under Phase I has been purchased by five firms and two are currently operating. The success of the Park in the long run in attracting high technology firms to fill the area developed under Phase I remains to be determined.

Issue 3.4 Public Information

Was there a public information strategy?

Advertisements were placed in a local newspaper, the Chronicle-Herald and a local magazine, the Nova Scotia Business Journal. The objectives were to increase the awareness of the federal and provincial support for the AMSA. The budget for the public information and evaluation component was $100,000, see Table 1. Given the budget for public information, the activities undertaken were limited.

Limited public information activities were undertaken.

5.4 Alternatives

Issue 4.1 Implementation

Did the implementation of activities proceed in accordance to the AMSA intentions?

Activities were undertaken in accordance with the timing and resource commitments specified in the AMSA. The AMSA participants were satisfied with the implementation of the agreement. It was suggested that improvements in the functioning of the management committee could be achieved through the following means: more frequent meetings and effective consultation. However, no major alterations to the management structure were suggested.

The management structure and resource commitment were appropriate for undertaking the activities of the AMSA.

Issue 4.2 Efficiency

Was the AMSA delivered in a cost-effective manner?

(a) Cost/Job created through AMSA

Data is provided below on the cost per job created for a number of sub-agreements to permit comparison with AMSA. The AMSA has created jobs at a relatively higher cost compared to other sub-agreements. (see Table 6)

Several qualifications are required concerning the cost efficiency of job creation. First, it must be recognized that the cost of each sub-agreement yields other benefits in addition to jobs, which are not evaluated here. In other words, not all of the costs are associated with job creation. Second, funds from other programs contributed to the creation of the jobs and should be included in a

comprehensive evaluation of costs. The implication of this is that the cost per job created under the AMSA would be even higher. Third, the reader is cautioned against accepting only a short run evaluation of the employment generating effects of this Sub-

Table 6

Cost per Job Created by Sub-Agreements, Nova Scotia, Selected Years

Sub-agreement	No. of Jobs	$ in millions	Cost per job in $ millions
Industrial Development (1976-81)	772	19	.02
Agricultural Development (1976-81)	572	30	.05
Tourism (1977-82)	202	11	.05
Strait of Canso (1975-84)	444	23	.05
AMSA (1984-87)	300	31	.10

Source: Calculated from administrative records, DRIE

agreement. That is, in the long run, if the number of jobs created increases as more firms are attracted to the Province, the cost per job decreases.

(b) Cost/Acre of land in the Aerotech Business Park.

The cost of developing land in the Aerotech Business Park is relatively lower per acre compared with other industrial parks. The representative of HCIC interviewed estimated that the cost of developing land under Phase I is $45,000/acre which is approximately $1.05/square foot. In contrast, the representative of Burnside Industrial Park estimated that the development cost of

land in Brunside averaged $2.00/square foot over the past 10 years. The expansion of 1,000 acres in the new phase at Burnside is expected to be more costly due to the change in terrain. It is estimated that the development cost will be approximately $3.60/square foot.

There are two main reasons for the relatively lower cost of development of the Aerotech Business Park. First, the estimate of $1.05/square foot is based upon a calculation which defers $10 million of already incurred expenditures to Phase II. These expenditures include costs of a water system, water filtration plant, pumping station, sewage treatment and 1900 acres of land. Given that land developed during Phase II will use these services the deferral of a proportion of the expenditures to Phase II is acceptable. Second, the cost of development is relatively low because it does not include such costs as those associated with grading, landscaping, pre-development of the site and site cleaning. These activities are undertaken by the purchaser of land in accordance with the restrictions outlined by the HCIC.

(c) Cost/Student

Costs of training students at AMTC are considered to be comparable to other technical programs, excluding capital costs. The representative of NSIT estimated that the cost/student trained at the AMTC was $8-$9,000/year. This compares to $10,000/year for a student in the medical laboratory technician program and $8-$10,000/year in the engineering technician program.

In the short run, the AMSA has not been very efficient in creating jobs in terms of cost per job in comparison to other sub-agreements. However, in the long run as more jobs are created, the cost per job will decline. The cost of developing land in the Aerotech Business Park in Phase I is lower compared to other industrial parks due to: the feasibility of sharing certain infrastructural costs with land to be developed in Phase II; and

the fact that the costs associated with land clearing, site preparation and landscaping among others are undertaken by the purchaser. The cost of training students at the AMTC are comparable to other programs, if capital costs are excluded.

Issue 4.3 Implications

What has been learned about AMSA that may assist in designing a new high technology agreement?

Advanced manufacturing systems and the high technology sector in general are becoming increasingly important, and likewise so is the importance of understanding the appropriate instruments to affect this sector. Several comments are made below which are of relevance to sub-agreements in general as well as of particular concern to those of a high technology orientation. Specific long run implications of the Aerotech Business Park and Training Facility have been discussed under section 5.3.

First, in the case of the AMSA, the Federal and Provincial Governments assisted the development of an initiative which otherwise may not have been implemented. The initiative met the criteria established by the overall ERDA framework agreed to by the two parties. The AMSA provides an example of the ability of the governments to be responsive to a perceived need and to assemble programs accordingly.

Secondly, as in all sub-agreements, it is necessary to respond to opportunities which fail to be addressed by existing policies and programs. For the most part, it appears that the AMSA complements other initiatives taken in the technology sector. However, in order to gain maximum economic impact from funds allocated to government programs, it is necessary to ensure that duplication does not occur.

Finally, high technology firms respond to similar factors as traditional manufacturing firms although skilled labour appears to be of relatively greater importance. In this sense, the AMSA was well conceived. The need for a skilled labour force with high technology skills needs to be considered in future agreements.

While it is clear that an appropriately skilled labour force is a crucial factor influencing firms' location decisions, there is some disagreement about the nature of the skills that are in high demand. During the course of the interviews, it was argued that there is a greater need for professional engineers versus technicians and therefore, an Aerotech Business Park/Technical University of Nova Scotia arrangement would have been more appropriate. However, the results of our survey of Park tenants did not support this concern. This apparent contradiction disappears when one examines the type of skills demanded in relation to the type of business enterprise. That is, enterprises with a high percentage of R&D compared to manufacture of products, are more likely to demand professionals than technicians. Therefore, it is not surprising that P&WC and Litton Systems are satisfied with the skills of the AMTC graduates given that they are essentially involved in production[24].

What emerges from this discussion is that the AMTC, while fulfilling the labour demands of P&WC, Litton Systems and similar firms, is unlikely to be able to provide training in all aspects of high technology. There is also a need for other institutions to provide a wide variety of high technology skills if Nova Scotia is to be successful in attracting firms involved in R&D.

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[24]In addition, P&WC participated in developing the program of the AMTC.

6.0 CONCLUDING COMMENT

The Advanced Manufacturing Support Sub-agreement, 1985-1988 (AMSA) between the Federal and Provincial Governments was designed to create economic growth and diversity through fostering the development of the high technology sector in Nova Scotia. Given the recent, world-wide, high technology developments which are revolutionizing the manufacturing process, the orientation of the Sub-agreement is appropriate. Fostering an environment conducive to the adoption of high technology is essential in assisting new and existing firms to maintain their competitive edge. The strategy underlying the AMSA is comprised of two main components, an Advanced Manufacturing Technical Training Facility and a Technological Business Park. The importance of a skilled labour force and locations exhibiting the features of good transportation, a campus-style setting, among others, in attracting high technology firms have been documented in the literature and by the results of the survey conducted for this evaluation. Therefore, these two components are logically linked to attaining the objectives of new employment opportunities in the high technology sector and accelerating the adoption of technology. Clearly however, these components are themselves insufficient, and are only part of an overall strategy to promote the high technology sector which requires building human resources strengths with a broad range of technical and professional expertise, strengthening the links between industry and research, and creating an attractive investment environment.

Under the AMSA, an Advanced Technical Training Facility and a Technology Business Park have been created. The Training Facility was established at NSIT and can be considered as complementary to other NSIT programs and technical programs at local universities. The hardware and software facilities have widely been reported to be state-of-the-art. However, a number of challenges are faced by the AMTC which include the difficulties and expense associated with keeping the facility and accompanying expertise up-to-date. This

will require on-going funding, as well as recruitment of suitable students as the funding pool diminishes. The training program has been designed by NSIT staff and P&WC. P&WC has indicated satisfaction with the skills of graduates whom they have hired. However, as P&WC meets its demand for technologists and new fields of expertise are demanded, other opportunities for using the facility will need to be explored. This will include not only reorientation of focus but also introduction of a variety of course lengths and day release programs to ensure that the facility remains relevant to market conditions and is used efficiently. Strengthening human resources is an essential aspect of increasing and maintaining business competitiveness and specifically for attracting high technology firms.

A Technology Business Park has been developed adjacent to the Halifax International Airport. Of the 498 acres developed under Phase One, about one-third has been purchased. The location of the Park, the emphasis on creating a campus style setting, restricting entrance to the Park to high technology and selected service firms, an anchor tenant and long term commitment will assist in the success of the Park. However, its long run viability remains to be determined and will be affected by the definition of high technology, the marketing plan, the development of linkages with other support services including financial services and restaurants, among others, as well as with universities, research institutes and laboratories.

Progress towards the attainment of the objectives of high technology employment creation, technology adoption and economic growth and diversification has been achieved, although at substantial cost. About 300 new jobs have been created as a result of the AMSA and employment opportunities are expected to expand over the next 5 years. While the jobs have been filled by residents of Nova Scotia, not all of the jobs can be be considered to be "high technology" jobs. Advanced manufacturing production

processes have not yet been widely adopted in the Province. However, there has been interest displayed by several firms in such technology, and adoption is made more attractive by the greater availability of skilled labour due to the AMTC program. Economic impact of the AMSA is relatively small given the low level of production of the two new firms operating in the Park and the relatively small amount of local purchases. The economic impact is expected to increase over time as production of existing firms increase and additional firms locate to the area. The substantial cost of the AMSA combined with the cost of other programs to influence the location decisions of firms reduce the net economic benefit of the AMSA.

This ex-poste evaluation of the AMSA, conducted only a few months after the completion of the Sub-agreement, concludes that the AMSA has improved the environment for attracting high technology industry and improving business competitiveness. The short run economic impact has been relatively small and achieved at substantial cost. The cost increases considerably if one takes into account the cost of other programs indirectly related to the AMSA. However, it is reasonable to expect that the long term economic impact resulting from the AMSA will require long term commitment and undertaking of other complementary actions. The actions will foster the development of a high technology sector in Nova Scotia and improve business competitiveness through the adoption of advanced manufacturing processes.

APPENDICES

A. EVALUATION ISSUES, DATA REQUIREMENTS AND DATA SOURCES
B. PUBLICATIONS AND DOCUMENTS REVIEWED
C. INTERVIEW GUIDES AND SURVEY QUESTIONNAIRES
D. PEOPLE INTERVIEWED
E. AUTOMATED MANUFACTURING TECHNOLOGY CENTRE PROGRAM ADMISSION REQUIREMENTS AND DESCRIPTION OF COURSE CONTENT

APPENDIX A
EVALUATION ISSUES, DATA REQUIREMENTS AND DATA SOURCES

Appendix A

Evaluation Issues, Data Identification and Data Sources

ISSUES	DATA	DATA SOURCES			
		Document	Administrators	Observers	NSIT
1.0 RATIONALE					
1.1 High Tech Orientation					
Was AMSA well conceived in light of the present and expected socio-economic (and technological) environment in N.S.?					
- were the objectives of AMSA appropriate? ie. is the development of a high technology sector an appropriate objective?	- objectives of the Agreement compared to data on present and expected socio-economic conditions	- Agreement - White Paper - Regional Development - Economic forecasts relating to technology	DRIE DITT HCIC		
- were there additional unstated objectives?	- other benefits and costs of Park and Training Facility				
- were the objectives modified in light of changes - in economic, policy, technological environment	- modifications/revisions in project briefs	- background paper - progress reports - minutes	DRIE HCIC DITT		x
1.2 Strategy					
- Were the activities and outputs logically linked to the attainment of the objectives? ie. is the strategy appropriate?	- review AMSA in light of other gov't prog. literature on tech dev't, planning studies	- as above			
- how critical are the features of the Park and Training Facility in the dev't of a high tech sector.	- review of other programs designed to develop a high tech sector	- other tech sub-agreements	DRIE, DITT	x	x
- was the level of effort and funding among programs consistent with the strategies and objectives	- compare with other sub-agreements	- evaluations of tech related projects - sub-agreements	DRIE, DITT		
- was the time frame realistic in terms of being able to effectively address the problems.	- comparison of AMSA with literature on industrial parks, technology adoption	- industrial parks and high tech literature			x
1.3 Relationship with ERDA					
Does AMSA contribute towards the achievement of the Canada/Nova Scotia ERDA objectives?	- review 1.1 above in light of ERDA objectives and other sub-agreement	- ERDA, AMSA other sub-agreements	DRIE, DITT		
- are the objectives of AMSA still relevant given any possible changes in the socio-economic environment.	- present economic situation and forecasts	- all of the above			

ISSUES	DATA	DATA SOURCES					
		Documents	Park Firms	Graduates	NSIT	Administrators	Other Firms
2.0 OBJECTIVES ACHIEVEMENT							
2.1 Evaluability							
Are the objectives of AMSA sufficiently clear and precise to permit evaluation.							
- were measurable indicators identified	- objectively verifiable indicators	- project documents				x	
2.2 Employment Opportunities							
Have employment opportunities been created?							
- as a result of the Park, how many jobs have been created?	- # of jobs; # from N.S.		x				
- how many are high tech?	- tasks and responsibilities by job		x				
- are they low or high waged?	- wage		x				
- is the present employment situation expected to change?	- forecast on expansion and its impact on labour demand		x				
- does the present employment situation conform with the original intentions of AMSA?	- compare above with targets of Park program	- program documents					
- were there any barriers to the achievement of this objective?						x	
- how many employees are local vs. imported?			x.			x ECIC and contractors	
- were construction jobs created? Were they from N.S.?	- # construction jobs; # from N.S.						
As a result of the Training Facility, how many jobs have been created?							
- how many are high tech?	- # jobs from N.S.				x		
- are they low or high waged?	- tasks and responsibilities by job				x		
- is the present employment situation expected to change?	- wage				x		
- does the present situation conform with the original intention of AMSA?	- forecast on expansion and impact on labour demand						DOE
	- compare with targets of Training program.	- program documents					DOE
- were there any barriers to the achievement of this objective?					x		DOE
- were construction jobs created?	- # jobs; # from N.S.				x		DOE
- were they filled by Nova Scotians?							

ISSUES	DATA	DATA SOURCES					
		Documents	Park Firms	Administrators	Observers	Other Firms	NSIT
2.0 OBJECTIVES ACHIEVEMENT (continued)							
2.3 Technology Adoption							
Has the rate of technology adoption been accelerated as a result of AMSA?							
- what was the rate of tech adoption prior to the AMSA?	- high tech firms prior to 1985, type of product and prod'n process value of product	DOD statistics		x			
- what was the rate of technology adoption during the AMSA?	- high tech firms 1988 type of product and prod'n process, value of product			x		x	x
2.4 Economic Impact							
What has been the economic impact of AMSA?							
- has there been economic growth?	- review of data outlined below						
- with regards to the Park, what have been the multiplier effects?							
- construction	- construction costs	- project briefs	x	HCIC			
- ongoing due to Park firms production	- value of production		x				
- projected impact	- forecasts		x				
- has it competed with other Parks?	- assess excess capacity and characteristics of other Parks	- review of DOD data on industrial parks of N.S.		x	x		
- with regard to the Training Facility, what have been the multiplier effects? - construction	- construction costs	- project briefs		DOE			x
- has there been greater diversification of the economy as a result of AMSA?	- nature and value of Park firms/ outputs other firms		x			x	

ISSUES	DATA	DATA SOURCES						
		Documents	Administrators	Students	Observers	NSIT	Other Firms	Park Firms
3.0 IMPACTS AND EFFECTS								
3.1 Technical Training Facility								
Has a technical training facility been established and operated according to AMSA specifications?								
- was it established - buildings and computers	- buildings, money expended	- DOE, NSIT documents	DITT, DOE			x		
- type of training offered?	- details of the training		DITT, DOE			x		
- # students and graduates each year?	- # students and graduates					x		
- have they found jobs? high tech jobs?	- # jobs, # high tech jobs			x		x	x	x
- have there been any unintended impacts as a result of the Facility (+/or -)?	- other benefits and costs		DITT, DOE		TUNS	x		
- has it complemented or conflicted with any other programs?	- relationship with other programs		DITT, DOE		TUNS	x		
- does it conform with the original intentions including targets for students and physical facilities	- compare actual situation with - compare actual situation with sub-agreement and project authorizations.	- program documents						
3.2 High Tech Business Park								
Has a high technology business park been established and operated according to AMSA specifications								
- was the Park established?	- buildings, money expended	- DRIE, HCIC documents	DRIE, HCIC					x
- are the features of the Park sufficient to attract high tech firms? (including transportation facilities)	- assessment of the Park in light of key features identified	- high tech literature					x	x
- have there been any unintended impacts due to the park (+ or -)?	- other benefits and costs		DRIE, DITT HCIC		x	x	x	x
- has the Park complemented or conflicted with other gov't programs?	- relationship with other programs	- other sub-agreements and other programs	DITT, DRIE			x		
- does it conform to the original intentions of AMSA? eg. incubator facilities shared equipment and administration services.	- review of sub-agreement in light of data collected above	- as above						

ISSUES	DATA	DATA SOURCES				
		Documents	Other Firms	Park Firms	Administrators	NSIT
3.0 IMPACTS AND EFFECTS (continued)						
3.3 Firms Attracted						
Have high tech firms been attracted to N.S.? due to trained labour and Park? i.e. would they have located here without AMSA?	- total # high tech firms pre and post AMSA	DITT	x		DITT	x
	- motivation for locating in N.S.		x			
- what type of high tech firms are they?	- nature or product and production process	DITT	x		DITT	x
- are additional firms expected to move to the Park?					HCIC	
- have there been any unintended impacts (+ or -) as a result of firms relocating to N.S.?	- other benefits and costs		x	x	DITT, HCIC	
- has the relocation of firms had any impact on other government programs (complementary or conflicting)?	- major impacts on other programs		x	x	DITT	
- do these impacts conform to AMSA's intention?	- assessment of above in light of the AMSA					
3.4 Public Information						
Have activities been conducted according to AMSA intentions to increase public awareness of AMSA programs?						
- were activities conducted?	- documentation of expenditures - project authorization	DRIE			HCIC, DRIE	

ISSUES	DATA	DATA SOURCES					
		Documents	Administrators	NSIT	Park Firms	Other Firms	Students
4.0 ALTERNATIVES							
4.1 Implementation							
Did the implementation of activities proceed efficiently and in accordance to AMSA intentions?							
- was the implementation acceptable to administrators, clients, others?			x	x	x		x
- was there sufficient level of resource commitment to efficiently implement the programs? Was there sufficient flexibility to permit changes in program funding where necessary?	- level of resource commitment relative to other programs - flexibility	- other tech sub-agreements	x x	x	x		
- was the structure of management and program committee appropriate? - were there adequate administrative arrangements amongst administrators, staff, clients, public and evaluation process?	- administrative structures	- AMSA	x				
- did the implementation of programs proceed as expected? - in terms of cost? - in terms of timing? - in terms of responsibilities?	- review of project progress reports	- annual progress reports	x				
- were there any barriers to the implementation (internal or external) of AMSA?	- any impediments		x	x	x		x

ISSUES	DATA	DATA SOURCES				
		Documents	Administrators	NSIT	Firms	Firms	Students
4.0 ALTERNATIVES (continued)							
4.3 Implications							
Is the AMSA strategy still relevant and should it be used to promote technology development elsewhere?							
- are the programs still relevant and should they be adopted elsewhere	- review all data and assess applicability						
- is the current delivery mechanism appropriate for future programs	- review delivery mechanism design, implementation, management structure						
- what are the critical factors determining the success or failure of the AMSA program	- identify critical factors		x	x	x	x	x
- how might anticipated changes in the social and economic environment affect the implementation of future programs?	- review all data in light of forecasts of socio-economic and technological environment	economic forecasts					

ISSUES	DATA	DATA SOURCES						
		Documents	Administrators	NSIT	Park Firms	Other Firms	Students	Other
4.0 ALTERNATIVES (continued)								
4.2 Efficiency								
Are there more efficient ways to promote technological development								
- how does the development cost per acre compare with other Parks in the Region?	- cost/acre	- progress reports	DRIE, HCIC					Industrial Commissions
- how does the cost per student trained compare with other technical programs?	- cost/student	- progress reports	DITT	X				TUNS
- how does this job creation program compare with other programs in the high tech sector? - what was the cost per job?	- cost/job	- evaluation of other tech projects	DITT, DRIE					
- did AMSA promote economic growth efficiently in comparison to other economic development programs?	- assess above data in comparison to other evaluations	- as above	DITT, DRIE					

APPENDIX B

PUBLICATIONS AND DOCUMENTS REVIEWED

- Building Competitiveness - A White Paper on Economic Development.
- Canada/Nova Scotia Economic and Regional Development Agreement.
- Atlantic Region Industrial Parks: An Assessment of Economic Impact.
- Aerospace in Canada - Outlook and Strategy.
- Task Force on Federal Policies and Programs for Technology Development.
- The Bottom Line Technology, Trade and Income Growth.
- Industrial Estates in 13 Countries.

APPENDIX C

INTERVIEW GUIDES AND QUESTIONNAIRES

INTERVIEW GUIDE

Program Administrators

Department of Industry, Trade and Technology

It may be helpful to discuss the purpose of the evaluation study particularly if interviewees have not participated in such an evaluation previously. For example: note the importance of being able to draw lessons from this Sub-agreement which may assist in the future planning and implementation of other programs and sub-agreements.

RATIONALE

High Tech Orientation

1. What do you consider to be the main events leading up to the design and implementation of AMSA? (To guide the discussion: N.S. White Paper on Economic Development 1984, Strategic Priorities identified in the Canada/Nova Scotia: Economic and Regional Development Agreement 1984, HCIC application for assistance to develop a High Tech Industrial Park, background (Green Paper) to, and/or the 1988 White Paper on Community Colleges ...)

2. Did the objectives of the AMSA (or objectives of each of its component programs) change over the course of the Sub-agreement, for example in response to changes in the general economic situation or relevant events such as prospective tenants? and why? (Try to separate any changes for each of the two programs)

3. Does AMSA complement/conflict with other DITT programs (eg. industrial incentives programs arranged through Industrial Promotions, involvement in other industrial parks) and other sub-agreements (eg. Sub-agreement on Technological Transfer and Innovation)? If so, how?

Strategy

4. In your opinion was the development of an industrial park the best way of strengthening the high tech sector? (To guide the discussion if necessary: for example, rather than assistance in the development of an incubator mall for high tech businesses, providing similar industrial incentives to firms to locate in some of the existing industrial parks)

5. In your opinion was improving labour's high tech skills a necessary part of promoting the high tech sector? and why?
   Why was it that automated manufacturing was selected as the particular area of skill development?

6. Was the level of funding sufficient to implement the two programs effectively?

7. Three years (1985 to 1988) was the amount of time specified to carry out the programs specified in the Sub-Agreement. Was this sufficient time to effectively promote technological development?

Relationship with ERDA

8. How do you perceive the relationship between the objectives of AMSA and ERDA?

OBJECTIVES ACHIEVEMENTS

Employment Opportunities

9. Were specific job creation targets identified and expected to be achieved by the AMSA? For example in terms of such items as:

   Number of people working at firms in the Park:
   Percentage of total labour who lived in Nova Scotia prior to working with firms at the Park:
   Percentage of total labour considered to be technical/ professional:

   Number of construction jobs created:
   Percentage of total jobs filled by Nova Scotians:

   Could you estimate employment opportunities created in terms of the same items:

   Number of people working at firms in the Park:
   Percentage of total labour who lived in Nova Scotia prior to working with firms at the Park:
   Percentage of total labour considered to be technical/ professional:

   Number of construction jobs created:
   Percentage of total jobs filled by Nova Scotians:

10. Do you perceive any measures which might increase the employment opportunities in the future?

11. Could there have been any measures undertaken during the design and implementation of the AMSA which might have increased the employment opportunities?

Technology Adoption

12. Were targets set and objective indicators identified for, technology adoption? For example, the number of additional X high tech firms to be located in the Halifax area by the time the AMSA expired.

Economic Impact

13. Were targets set and objective indicators identified for economic growth?

IMPACTS AND EFFECTS

Technical Training Facility

14. What was the intended completion date of the AMTC? When was it actually completed? If there is any difference, what factors might have contributed to the difference? (In discussing this question try to separate out dates for the two components: (a) buildings and equipment component (b) software support. Also ask about whether software maintenance is ongoing and as expected.)

15. Were targets set for the number of students to be trained at the AMTC?

16. This program has increased the supply of human resources with automated manufacturing skills. The majority have been hired by Pratt & Whitney Canada. Was this the intended impact? If not what was the intended impact? Have there been other impacts as a result of the AMTC program?

17. Has the increased availability of labour with high tech skills complemented any other DITT programs?

Aerotech Business Park

18. The Park has been successful in attracting tenants and hence appears to have had some of the desired impact. Have there been any additional (i.e. unintended) positive impacts of the Park? (eg. attracting other firms to locate in the Halifax area....).

19. Has the Park had any (unintended) negative impacts? (eg. attracted firms which otherwise would have located in previously existing parks, generated less tax revenue than expected, cause environmental damage...)

Firms Attracted

20. In your opinion have other firms using automated manufacturing systems located in the Halifax area (or expanded) as a result of the increased availability of labour with high tech skills?
    If so, what type of firms? (try to obtain data on approximate size, nature of the production process and product)
    Have there been any unintended impacts as a result?
    Has the expansion/relocation of firms had any impact on other DITT programs?

Public Information

21. What public information activities were undertaken to increase public awareness of AMSA programs? (advertisements in the Chronicle Herald and N.S. Business Journal)

ALTERNATIVES

Perhaps reiterate the importance of seeing the subsequent questions in the light of trying to learn from the design and implementation of AMSA in order to implement effective programs in the future. From your experience with this Sub-agreement what advice would you give to assist in the development of successful programs to promote technological development?

Implementation

22. Was there sufficient resource committment in terms of labour and money to efficiently and effectively implement the two programs? Was there any flexibility in program funding after the AMSA was signed? Was this flexibility sufficient?

23. It is our understanding that the Management Committee was comprised of two representatives from the DRIE and DITT and an ex-official member appointed from the Federal Government. Could any changes in this management structure be made to make implementation easier, more efficient or effective?

    How was the program committee structured? Could any changes in this structure be made to make implementation of the programs easier?

24. Did the implementation of the Training Facility program proceed as expected? in terms of cost? in terms of timing? in terms of responsibilities?

    If not, why not?

25. Were there any barriers to the implementation (internal or external) of the Aerotech Business Park? (eg. lack of adequate industrial incentive and tax credit package, industrial promotion activity....).

    Were there any barriers to the implementation (internal or external) of the AMTC?

Efficiency

26. In your opinion, how does the cost per student trained at AMTC compare to costs at other comparable high tech training facilities?

27. Under the AMSA, a number of jobs have been created at the Aerotech Business Park. In your opinion, how does the job creation impact of the programs conducted under the AMSA compare to other job creation programs in the high tech sector?

28. Similarly, how successful do you think these programs have been in promoting economic growth and diversification in the Province compared to other programs with which you are familiar? (Try to obtain details on the "comparison program" ....)

Implications

29. What do you consider to be the main factors contributing to the strengths and weaknesses of the Park to promote the high tech sector? (eg. possible strengths: having a major tenant such as Pratt & Whitney as an anchor tenant, proximity to the airport- possible weaknesses: lack of progress in developing the 'campus like' atmosphere, high cost of providing incentives to P&WC, lack of other firms, lack of diversified technological production base- narrow emphasis on military goods production ...)

    What are likely to be critical factors influencing its success/failure in the future?

30. What do you think are the critical factors determining the strengths and weaknesses of NSIT's AMTC? (Possible strengths: only centre of its kind in Canada - Possible weaknesses: its cost versus its rate of obsolescence)

    What are likely to be the main factors influencing its success/failure in the future?

We have asked a wide variety of questions in order to address the performance of the AMSA. However, perhaps there are some issues which have been neglected or addressed too lightly. Would you care to comment further upon any aspects relating to the AMSA?

INTERVIEW GUIDE

Program Administrators

Department of Regional Industrial Expansion

It may be helpful to discuss the purpose of the evaluation study particularly if interviewees have not participated in such an evaluation previously. For example: note the importance of being able to draw lessons from this Sub-agreement which may assist in the future planning and implementation of other programs and sub-agreements.

RATIONALE

High Tech Orientation

1. What do you consider to be the main events leading up to the design and implementation of AMSA? (To guide the discussion: N.S. White Paper on Economic Development 1984, Strategic Priorities identified in the Canada/Nova Scotia: Economic and Regional Development Agreement 1984, HCIC application for assistance to develop a High Tech Industrial Park...)

2. Did the objectives of the AMSA change over the course of the Sub-agreement, for example in response to changes in the general economic situation or relevant events such as prospective tenants? and why?

3. Does AMSA complement/conflict with other DRIE programs (eg. IRDP) and other Sub-agreements (eg. Sub-agreement on Technological Transfer and Innovation)? If so, how?

Strategy

4. In your opinion was the development of an industrial park the best way of strengthening the high tech sector? (To guide the discussion if necessary: for example, rather than assistance in the development of an incubator mall for high tech businesses, providing similar industrial incentives to firms to locate in some of the existing industrial parks)

5. In your opinion was improving labour's high tech skills a necessary part of promoting the high tech sector? and why?
   Why was it that automated manufacturing was selected as the particular area of skill development?

6. Was the level of funding sufficient to implement the two programs effectively?

7. Three years (1985 to 1988) was the amount of time specified to carry out the programs specified in the Sub-Agreement. Was this sufficient time to effectively promote technological development?

Relationship with ERDA

8. How do you perceive the relationship between the objectives of AMSA and ERDA?

OBJECTIVES ACHIEVEMENTS

Employment Opportunities

9. Were specific job creation targets identified and expected to be achieved by the AMSA? For example in terms of such items as:

   Number of people working at firms in the Park:
   Percentage of total labour who lived in Nova Scotia prior to working with firms at the Park:
   Percentage of total labour considered to be technical/ professional:

   Number of construction jobs created:
   Percentage of total jobs filled by Nova Scotians:

   How many have been created?

10. Do you perceive any measures which might increase the employment opportunities in the future?

11. Could there have been any measures undertaken during the design and implementation of the AMSA which might have increased the employment opportunities?

Technology Adoption

12. Were targets set and objective indicators identified for technology adoption? For example, a number of additional firms locating in the Halifax area by the time the AMSA expires.

Economic Impact

13. Were targets set and objective indicators identified for economic growth?

IMPACTS AND EFFECTS

Technical Training Facility

14. This program has increased the supply of human resources with automated manufacturing skills. The majority have been hired by Pratt & Whitney Canada. Was this the intended impact? If not what was the intended impact? Have there been other impacts as a result of the AMTC program?

15. Has the increased availability of labour with high tech skills complemented any other DRIE programs?

Aerotech Business Park

16. What was the intended completion date of the Aerotech Business Park? When was it actually completed? If there is any difference, what were the contributing factors?

17. The Park has been successful in attracting tenants and hence appears to have had some of the desired impact. Have there been any additional (i.e. unintended) positive impacts of the Park? (eg. attracting other firms to locate in the Halifax area....).

18. Has the Park had any (unintended) negative impacts? (eg. attracted firms which otherwise would have located in previously existing parks, generated less tax revenue than expected, caused environmental damage...)

Public Information

19. What public information activities were undertaken to increase public awareness of AMSA programs? (advertisements in the Chronicle Herald and N.S. Business Journal)

ALTERNATIVES

Perhaps reiterate the importance of seeing the subsequent questions in the light of trying to learn from the design and implementation of AMSA in order to implement effective programs in the future. From your experience with this Sub-agreement what advice would you give to assist in the development of successful programs to promote technological development?

Implementation

20. Was there sufficient resource committment in terms of labour and money to efficiently and effectively implement the two programs? Was there any flexibility in program funding after the AMSA was signed? Was this flexibility sufficient?

21. It is our understanding that the Management Committee was comprised of two representatives from the DRIE and DITT and an ex-official member appointed from the Federal Government. Could any changes in this management structure be made to make implementation easier, more efficient or effective?

    How was the program committee structured? Could any changes in this structure be made to make implementation of the programs easier?

22. Did the implementation of the Aerotech Business Park program proceed as expected? in terms of cost? in terms of timing? in terms of responsibilities?

    If not, why not?

23. Did the implementation of the Training Facility program proceed as expected? in terms of cost? in terms of timing? in terms of responsibilities?

    If not, why not?

24. Were there any barriers to the implementation (internal or external) of AMSA? (eg. lack of adequate industrial incentive and tax credit package, industrial promotion activity....).

Implications

25. What do you consider to be the main factors contributing to the strengths and weaknesses of the Park to promote the high tech sector? (eg. possible strengths: having a major tenant such as Pratt & Whitney as an anchor tenant, proximity to the airport possible weaknesses: lack progress in developing the 'campus like' atmosphere, high cost of providing incentives to P&WC, lack of other firms, lack of diversified technological production base-narrow emphasis on military goods production ...)

    What factors are likely to contribute to the success/failure in the future?

26. What do you think are the critical factors determining the strengths and weaknesses of NSIT's AMTC? (Possible strengths: only centre of its kind in Canada - Possible weaknesses: its cost versus its rate of obsolescence)

    What factors are likely to contribute to the success/failure in the future?

We have asked a wide variety of questions in order to address the performance of the AMSA. However, perhaps there are some issues which have been neglected or addressed too lightly. Would you care to comment further upon any aspects relating to the AMSA?

INTERVIEW GUIDE

Participants

Nova Scotia Institute of Technology

It may be helpful to discuss the purpose of the evaluation study particularly if interviewees have not participated in such an evaluation previously. For example: note the importance of being able to draw lessons from the implementation of the AMTC and more broadly the Sub-agreement which may assist in the planning and implementation of other programs and sub-agreements.

RATIONALE

High Tech Orientation

1. What do you consider to be the main events leading up to the design and implementation of the AMTC? (To guide the discussion: N.S. White Paper on Economic Development 1984, Task Force Report on Technological Innovation and Transfer, The Bottom Line ...)

2. Did the objectives of the AMTC training program change over the course of the Sub-agreement? (For example the nature of the skills to be taught in relation to changes in the general economic and technological situation or relevant events such as prospective tenants, P & WC production technology plans ....).
   And if so, why?

3. Do the objectives of the AMTC training program complement/conflict with other NSIT programs? If so, how?
   Does it complement/conflict with programs at other training facilities? (for example: CAD/CAM at TUNS, private training programs such Magna International). If so, how?

Strategy

4. In your opinion was improving labour's high tech skills a necessary part of promoting the high tech sector?
   What do you consider the advantages of the automated manufacturing skill development as opposed to other areas of high tech?
   Should other areas of technological skills training also be considered in the future?

5. Three years (1985 to 1988) was the amount of time specified in the AMSA to carry out the AMTC program. Was this sufficient time to effectively promote tech skills training?

Is the program expected to be ongoing? in the same form, or will the objectives of the high tech training be changed?

OBJECTIVES ACHIEVEMENTS

Employment Opportunities

6. Were specific job creation targets identified and expected to be achieved by the AMTC? For example in terms of such items as:

   Number of construction jobs created:
   Percentage of total jobs filled by Nova Scotians:

   Number of jobs at AMTC:
   Percentage of jobs which are high tech:
   Percentage of jobs which are filled by Nova Scotians:

7. How many construction jobs were created (number of person months)?
   Percentage of total jobs filled by Nova Scotians?
   Number of jobs at AMTC:
   Percentage of jobs which are high tech:
   Percentage of jobs which are filled by Nova Scotians:

Technology Adoption

8. Has the increased availability of labour with high tech skills led to increased rate of technology adoption? (for example, small firms that changed over to an automated production system once skilled labour was available). Try to obtain details of the number of firms, type of technology adopted and nature of the product produced.

IMPACTS AND EFFECTS

Technical Training Facility

9. What was the intended completion date of the AMTC? When was it actually completed? If there is any difference, what factors might have contributed to the difference? (In discussing this question try to separate out dates for the two components: (a) buildings and equipment component (b) software support.)

   Also ask about whether software maintenance is ongoing and as expected.

10. How many students have been admitted into the ATMC program each year? How many graduated?
    Were any targets set? If there is any difference, what factors contributed to the difference?

11. This program has increased the supply of human resources with automated manufacturing skills. The majority have been hired by Pratt & Whitney Canada.

    Was this the intended impact? If not what was the intended impact? Have there been other impacts as a result of the AMTC program?

12. Has the increased availability of labour with high tech skills complemented/conflicted with any other NSIT programs?

Firms Attracted

13. Have other firms been attracted to the area due to the increased availability of skilled labour? (Try to obtain detail on the number and types of production process and products)

    What impact has this had on the AMTC program, if any?
    Are additional firms expected to locate in the Halifax area in the future as a result of the availability of skilled labour?

ALTERNATIVES

Perhaps reiterate the importance of seeing the subsequent questions in the light of trying to learn from the design and implementation of AMSA, in order to implement effective programs in the future. From your experience with this program to promote technological development what advice could you give that would assist in the planning of future programs to strengthen the high tech sector?

Implementation

14. Was there sufficient resource committment in terms of labour and money to efficiently and effectively implement each of the components (buildings/equipment and software support/maintenance) of the AMTC?
    Was there any flexibility in program funding after the agreement was signed?

    Was this flexibility sufficient?

15. Could you describe the administrative arrangements for the design and implementation of the AMTC? (For example, a Management Committee comprised of Dept. of Education, NSIT and P&WC officials).
    Could any changes in this management structure be made to make implementation easier, more efficient or effective? (For example, the involvement of other agencies, different/better lines of communication.....)

16. Did the implementation of the AMTC program proceed as expected? in terms of cost? in terms of timing? in terms of responsibilities?
    If not, why not?

17. Were there any barriers to the implementation (internal or external) of the AMTC (eg. lack of qualified teachers, software support and maintenance, promoting the program, ensuring its ongoing viability....)

Efficiency

Are there any estimates of the cost per student trained at the AMTC? If so, how do they compare with the estimated cost of other high tech training programs?

Implications

18. What do you think are the critical factors determining the strengths and weaknesses of NSIT's AMTC at present? (Possible strengths: only centre of its kind in Canada - Possible weaknesses: its cost versus its rate of obsolescence)

    What are likely to be the critical factors influencing its success/failure in the future?

We have asked a wide variety of questions in order to address the performance of the AMSA. However, perhaps there are some issues which have been neglected or addressed too lightly. Would you care to comment further upon any aspects relating to the AMSA?

INTERVIEW GUIDE

Participants

Halifax County Industrial Commission

It may be helpful to discuss the purpose of the evaluation study particularly if interviewees have not participated in such an evaluation previously. For example: note the importance of being able to draw lessons from this Sub-agreement which may assist in the future planning and implementation of other programs and sub-agreements.

RATIONALE

High Tech Orientation

1. What do you consider to be the main events leading up to the design and implementation of AMSA? (To guide the discussion: N.S. White Paper on Economic Development 1984, Strategic Priorities identified in the Canada/Nova Scotia: Economic and Regional Development Agreement 1984, HCIC application for assistance to develop a High Tech Industrial Park...)

2. Did the objectives of the AMSA change over the course of the Sub-agreement, for example in response to changes in the general economic situation or relevant events such as prospective tenants? and why?

3. Do the objectives of the AMSA complement/conflict with other HCIC programs and goals? If so, how?

Strategy

4. In your opinion what are the advantages of having an Aerotech Business Park?

   In what way does the development of an industrial park promote the high tech sector ?

5. Was the level of funding sufficient to implement the two programs effectively?

6. Three years (1985 to 1988) was the amount of time specified to carry out the programs specified in the Sub-Agreement. Was this sufficient time to effectively promote technological development?

OBJECTIVES ACHIEVEMENTS

Employment Opportunities

7. Were specific job creation targets identified and expected to be achieved during the construction of the Aerotech Park? For example in terms of such items as:

   Number of construction jobs created:
   Percentage of total jobs filled by Nova Scotians:

   How many construction jobs were created? What percentage of the total number of jobs were filled by Nova Scotians?

IMPACTS AND EFFECTS

Aerotech Business Park

8. In your opinion, what are the key features determining the viability of a high tech Park?

9. What was the intended completion date of the Aerotech Business Park? When was it actually completed? If there is any difference, what were the contributing factors?

10. How many acres have been developed? (Phase I was to have 291 acres according to the AMSA)
    What type of services have been provided?

11. The Park has been successful in attracting tenants and hence appears to have had some of the desired impact. Have there been any additional (i.e. unintended) positive impacts of the Park? (eg. attracting other firms to locate in the Halifax area....).

12. Has the Park had any (unintended) negative impacts? (eg. attracted firms which otherwise would have located in previously existing parks, generated less tax revenue than expected, cause environmental damage...)

13. Does the existence of the Park complement/conflict with any other HCIC programs?

Firms Attracted

14. How many firms are now located in the Park? How much space is currently being leased? Do you anticipate additional firms leasing space in the Park? (try to obtain details on # of firms, acres to be leased, revenues ...)

Public Information

15. What public information activities were undertaken to increase public awareness of AMSA programs? (advertisements in the Chronicle Herald and N.S. Business Journal)

ALTERNATIVES

Perhaps reiterate the importance of seeing the subsequent questions in the light of trying to learn from the design and implementation of AMSA in order to implement effective programs in the future. From your experience with this Sub-agreement what advice would you give to assist in the development of successful programs to promote technological development?

Implementation

16. Was there sufficient resource committment in terms of labour and money to efficiently and effectively implement the two programs? Was there any flexibility in program funding after the AMSA was signed? Was this flexibility sufficient?

17. It is our understanding that the Management Committee was comprised of two representatives from the DRIE and DITT and an ex-officio member appointed from the federal government. Could any changes in this management structure be made to make implementation easier, more efficient or effective?

    How was the program committee structured? Could any changes in this structure be made to make implementation of the programs easier?

18. Did the implementation of the Aerotech Business Park program proceed as expected? in terms of cost? in terms of timing? in terms of responsibilities?

    If not, why not?

19. Were there any barriers to the implementation (internal or external) of AMSA? (eg. lack of adequate industrial incentive and tax credit package, industrial promotion activity....).

Efficiency

20. What do you estimate to be the development cost per acre? How does this compare with the development cost per acre experienced in other Parks in this area?

Implications

21. What do you consider to be the main factors contributing to the strengths and weaknesses of the Park to promote the high tech sector at present? (eg. possible strengths: having a major tenant such as Pratt & Whitney as an anchor tenant, proximity to the airport, availability of skilled labour - possible weaknesses: lack progress in developing the 'campus like' atmosphere, high cost of providing incentives to P&WC, lack of other firms, lack of diversified technological production base - narrow emphasis on military goods production ...)

    What factors are likely to influence its success/failure in the future?

We have asked a wide variety of questions in order to address the performance of the AMSA. However, perhaps there are some issues which have been neglected or addressed too lightly. Would you care to comment further upon any aspects relating to the AMSA?

INTERVIEW GUIDE

Participants

Department of Education

It may be helpful to discuss the purpose of the evaluation study particularly if the interviewee has not participated in such an evaluation previously. For example: note the importance of being able to draw lessons from this Sub-agreement which may assist in the future planning and implementation of other programs and sub-agreements.

OBJECTIVES ACHIEVEMENTS

Employment Opportunities

1. Were specific job creation targets identified and expected to be achieved by the AMTC? For example in terms of such items as:

   Number of construction jobs created:
   Percentage of total jobs filled by Nova Scotians:

   Number of jobs at AMTC:
   Percentage of jobs which are high tech:
   Percentage of jobs which are filled by Nova Scotians:

2. How many construction jobs were created (number of person months)?
   Percentage of total jobs filled by Nova Scotians?
   Number of jobs at AMTC:
   Percentage of jobs which are high tech:
   Percentage of jobs which are filled by Nova Scotians:

IMPACTS AND EFFECTS

Technical Training Facility

3. In what ways has the AMTC and training program at NSIT complemented the set of technology training programs currently offered in Nova Scotia?
   In what ways has it conflicted with other programs?

4. Have there been any unexpected effects resulting from the AMTC? (Try to elicit both positive and negative effects. To promote discussion: for example, the ability of NSIT to offer short courses appropriate for working individuals, and in the evening to maximize the use of the facility; ...)

5. Does the AMTC and training program conform to the original intentions? If not, how does it differ? (For example, in terms of number of individuals trained, number employed with P&WC, level of understanding of computer integrated manufacturing .....)

ALTERNATIVES

Perhaps reiterate the importance of seeing the subsequent questions in the light of trying to learn from the design and implementation of AMSA in order to implement effective programs in the future. From your experience with this Sub-agreement what advice would you give to assist in the development of successful programs to promote technological development?

Implementation

6. Was there sufficient resource committment in terms of labour and money to efficiently and effectively implement the AMTC?
   Was there any flexibility in program funding after the AMSA was signed? Was this flexibility sufficient?

7. It is our understanding that the Management Committee was comprised of two representatives from the DRIE and DITT and an ex-official member appointed from the Federal Government. Could any changes in this management structure be made to make implementation easier, more efficient or effective?

8. Did the implementation of the Training Facility program proceed as expected? in terms of cost? in terms of timing? in terms of responsibilities?
   If not, why not?

9. Were there any barriers to the implementation (internal or external) of the AMTC?

Efficiency

10. In your opinion, how does the cost per student trained at AMTC compare to costs at other comparable high tech training facilities?

Implications

11. What do you think are the strengths and weaknesses of NSIT's AMTC at present? (Possible strengths: only centre of its kind in Canada- Possible weaknesses: its cost versus its rate of obsolescence)
    In your opinion, what factors are likely to influence the success/failure of the AMTC and training program in the future?

We have asked a wide variety of questions in order to address the performance of the AMSA. However, perhaps there are some issues which have been neglected or addressed too lightly. Would you care to comment further upon any aspects relating to the AMSA?

INTERVIEW GUIDE

Park Firms

It may be helpful to discuss the purpose of the evaluation study particularly if interviewees have not participated in such an evaluation previously. For example: note the importance of being able to draw lessons from the implementation of the AMSA which may assist in the planning and implementation of effective programs and sub-agreements in the future and thereby, strengthening the high tech sector.

OBJECTIVES ACHIEVEMENTS

Employment Opportunities

1. Were specific targets for the number of jobs to be created by------ (firm name) identified at the time of the signing of the AMSA? For example in terms of such items as:

   Number of people employed by -----(firm name):
   Percentage of the total jobs that are high tech/professional jobs?
   Percentage of the total staff that lived in N.S. prior to employment with P&WC?

2. How many people have been employed at ------ (firm name) in each year of its operation in the Aerotech Business Park?
   What percentage of the total jobs are considered to be high tech/professional jobs?
   What percentage of the total staff lived in N.S. prior to employment with -------- (firm name)?

3. If there is any difference between the targets and the actual situation, what do you consider to be the major factors contributing to this?

4. Do you forecast any changes in the number of people employed by---- ------ (firm name) in the future?

5. Could there have been any measures undertaken during the design and implementation of the AMSA which might have assisted---------- (firm name) to increase the employment opportunities?

Economic Impact

6. We are trying to assess the economic impact of the production of firms in the Aerotech Business Park. Could you give us an estimate of the value of the production of the firm for 1987? How do you expect this to change over the next few years?

   Could you give us a description of the types of products which have been produced by --------- (firm name) to date, and their approximate value?

7. Could you give us an estimate of the total wage bill?

IMPACTS AND EFFECTS

Technical Training Facility

8. Have you been able to hire people with the appropriate type of skills?
   Did the skill level of the NSIT (AMTC) graduates employed by-------(firm name) meet the expectations?
   In what way could they have been better prepared for their jobs?
   Are there any other training programs which should be considered? If so, what types of skills should be taught?

9. Have there been any unexpected impacts due to the type of training undertaken by the NSIT graduates? (Try to elicit both positive and negative unexpected impacts)

Aerotech Business Park

10. When ---------- (firm name) was investigating various locations for a new plant what were considered to be the key desirable features in a location?

11. When ---------- (firm name) decided to locate in the Aerotech Business Park what services were included as part of the arrangement with HCIC. Has the level of services actually provided met your original expectation?

12. In your opinion, is the level of services presently available in the Park sufficient to attract additional high tech firms to the Park? How might services be improved to increase the attractiveness of the Park and ensure its long run viability?

13. Have there been any unexpected impacts as a result of the Park? (Try to elicit both positive and negative unexpected impacts. For example, problems with water supply, acidity, lack of complementary firms in the Park ...)

ALTERNATIVES

Perhaps reiterate the importance of perceiving the subsequent questions in the light of trying to learn from the design and implementation of AMSA, in order to implement effective programs in the future. From your experience with this program what advice could you give which might assist in the development of effective programs in the future to promote a high tech sector?

Implementation

Questions 14 - 16 are relevant for Pratt & Whitney Canada only

14. Could you describe the administrative arrangements for the design and implementation of these programs? (For example, with regards to the NSIT program, a Management Committee comprised of Dept. of Education, NSIT and P&WC officials).
    Could any changes in this management structure be made to make implementation easier, more efficient or effective? (For example, the involvement of other agencies, different/better lines of communication, greater flexibility .....)

15. Did the implementation of the AMTC program proceed as expected? in terms of cost? in terms of timing? in terms of responsibilities?
    If not, why not?
    How could the implementation have been improved?

16. Were there any barriers to the implementation (internal or external) of the AMTC (eg. lack of qualified teachers, software support and maintenance, promoting the program, ensuring its ongoing viability....)
    Were there any barriers to the development of the Park?

17. Did the implementation of the Park proceed as expected? in terms of availability of services? in terms of timing?
    If not, why not?
    How could the implementation have been improved?

Implications

18. What do you think are the critical factors determining the strengths and weaknesses of NSIT's AMTC at present? (Possible strengths: only centre of its kind in Canada, specialized nature of the training program - Possible weaknesses: insufficient supply, inflexibility ...)
    What factors are likely to influence its success/failure in the future?

19. What do you think are the critical factors determining the strengths and weaknesses of the Aerotech Park? (Possible strengths: proximity to the airport, good road transportation- Possible weaknesses: lack of port facilities, lack of other complementary firms ...)

What factors are likely to influence it success/failure in the future?

We have asked a wide variety of questions in order to address the performance of the AMSA. However, perhaps there are some issues which have been neglected or addressed too lightly. Would you care to comment further upon any aspects relating to the AMSA?

INTERVIEW GUIDE

Knowledgeable Observers

Technical University of Nova Scotia

It may be helpful to discuss the purpose of the evaluation study particularly if interviewees have not participated in such an evaluation previously. For example: note the importance of being able to draw lessons from this Sub-agreement which may assist in the future planning and implementation of effective programs and sub-agreements. It may also be necessary to review the AMSA in terms of which agencies are involved and the nature of the two main programs.

RATIONALE

Strategy

1. The two main programs implemented under the AMSA are the Aerotech Business Park and the Automated Manufacturing Training Centre (AMTC) at the NSIT. What do you think are the critical features of the AMTC program in developing high technology skills.

IMPACTS AND EFFECTS

Technical Training Facility

2. As you know the NSIT has a facility and program to train students in a wide variety of aspects of computer integrated manufacturing. How does this program complement/conflict with programs at TUNS? (i.e. how do the programs differ - skills taught, prospective employers; is there duplication with TUNS CAD/CAM facility?)

ALTERNATIVES

Efficiency

3. Are there any estimates available on cost per student trained in various programs at TUNS? (If available, try to obtain sufficient detail on costs included to permit comparisons with AMTC).

Implications

4. What do you consider to be the critical strengths and weaknesses of TUNS programs?
   What factors will influence its success/failure in the future?

5. Do you anticipate any changes in existing programs, or the development of new programs, at TUNS?

6. What do you consider to be the critical strengths and weaknesses of AMTC program at present?
   What factors will influence its success/failure in the future?

We have asked a wide variety of questions in order to address the performance of the AMSA. However, perhaps there are some issues which have been neglected or addressed too lightly. Would you care to comment further upon any aspects relating to the AMSA?

INTERVIEW GUIDE

Knowledgeable Observers

Planners

It may be helpful to discuss the purpose of the evaluation study particularly if interviewees have not participated in such an evaluation previously. For example: note the importance of being able to draw lessons from this Sub-agreement which may assist in the future planning and implementation of effective programs and sub-agreements. It may also be necessary to review the AMSA in terms of which agencies are involved and the nature of the two main programs.

RATIONALE

Strategy

1. The two main programs implemented under the AMSA are the Aerotech Business Park and the Automated Manufacturing Training Centre (AMTC) at the NSIT. These two programs form the strategy to create employment opportunities, increase economic growth and diversification and promote a high tech sector. Do you think that the combination of a Park and Training Facility is the best strategy to achieve these goals?
   What might be some alternative strategies?

OBJECTIVES ACHIEVEMENT

Economic Impact

2. What do you consider to be the key features of a successful high tech industrial park?

3. In your opinion, will the Aerotech Business Park compete with other Parks in the area for tenants? (Accentuated by competition for industrial incentives....) If not, why not?

IMPACTS AND EFFECTS

High Tech Business Park

4. Have there been any unexpected impacts as a result of the Park?

ALTERNATIVES

Implications

5. What do you consider to be the critical strengths and weaknesses of the Aerotech Park at present?
   What factors will influence its success or failure in the future?

We have asked a wide variety of questions in order to address the performance of the AMSA. However, perhaps there are some issues which have been neglected or addressed too lightly. Would you care to comment further upon any aspects relating to the AMSA?

APPENDIX C

SURVEY QUESTIONNAIRE

High Tech Firms in Nova Scotia

1. Has the increased availability of labour with high tech skills led your firm to adopt new technology?

2. Has the development of the training center at N.S.I.T. had any impact on your firm, if so, please describe?

3. Should other areas of technological skills training be considered in the future, if so, which ones?

4. Would a training program in high tech skills be useful to your employees, if so, in what area?

5. What do you consider the critical factors determining the strengths and weaknesses of the training center at N.S.I.T?

6. Suppose your firm was considering relocating its business, what do you consider to be the key features affecting the decision of where to locate?

7. What factors influenced the decision to locate in your present location?

8. How important is it for your company to be located adjacent to an airport?

9. If your company was considering expanding, would the Aerotech Business Park be considered to be a suitable location? If so, why? if not, why not?

10. What do you think are the strengths and weaknesses of the Aerotech Business Park?

11. What do you think are the strengths and weaknesses of the Aerotech Business Park?

12. Other Comments.

SURVEY QUESTIONNAIRE

High Technology Firms in other Canadian Provinces

1. Suppose your firm was considering relocating its business, what do you consider to be the key features affecting the decision of where to locate?

2. What factors influenced the decision to locate in your present location?

3. How important is it for your company to be located adjacent to an airport?

4. If your company was considering expanding, would the Aerotech Business Park be considered to be a suitable location? If so, why? If not, why not?

5. What factors would lead your company to move to Nova Scotia?

6. Has your firm recently changed its production process? If so, what factors influenced this decision?

7. Would a training program in high tech skills be useful to your employees, if so in what area?

8. Is there a sufficient supply of skilled labour available to meet your needs?

9. Other comments.

APPENDIX D

INDIVIDUALS INTERVIEWED

Mr. Harvey Doane
Department of Industry, Trade and Technology

Ms. Naomi Blanchard
Department of Industry, Trade and Technology

Mr. Joe Driscoll
Principal, Nova Scotia Institute of Technology

Mr. Dermitt Mulrooney
Department of Education

Mr. Chris Reddy
Planner, City of Halifax

Mr. Tom Rath
Dartmouth Industrial Commission

Mr. Gary Buston
Technical University of Nova Scotia

Mr. B. MacLean
Litton Systems, Inc.

Mr. Doug Renton
Pratt & Whitney Canada, Inc.

Mr. Stuart MacDonald
Department of Regional Industrial Expansion

Mr. Lorne Denny
Halifax County Industrial Commission

Mr. Miles Thompson
Scotia Speedworld

APPENDIX E

AUTOMATED MANUFACTURING TECHNOLOGY CENTRE

ADMISSION REQUIREMENT AND COURSE CONTENT

Automated Manufacturing Technology

Training Programs

The programs of the Automated Manufacturing Technology Centre (AMTC) train students in the application of computers to the manufacturing industry, particularly with respect to the production of machine parts. All seats in the programs are allocated through Canada Employment and Immigration.

Facilities

The AMTC includes a complete integrated FMS cell; a computer centre; CAD/CAM, robotics, CNC and microcomputer laboratories; classrooms and support facilities.

Admission Requirements

Entry prerequisites to AMTC programs are as follows:

Production Technology

- Mechanical Engineering Technology Diploma
- Mechanical Engineering Degree
- Industrial Engineering Degree

Support Technology

- Electrical Engineering Technology Diploma
- Electronic Engineering Technology Diploma
- Instrumentation Engineering Technology Diploma
- Electrical Engineering Degree
- Computer Science Degree

Machining Technician

- Journeyman Machinist Certificate
- Journeyman Tool and Die Maker
- Journeyman Industrial Mechanic Certificate

Content

Core Courses (common to all programs)
- Computer Aided Design
- Computer Aided Manufacturing
- Computer Numerical Control
- Robotics
- Flexible Manufacturing Systems

Background Courses (according to program requisites and prerequisites)
- Electricity/Electronics
- Computer Concepts
- Conventional Machining
- Blueprint Reading, Geometric Dimensioning, Jig & Fixture Design
- Hydraulics/Pneumatics

Source: Reproduced from Nova Scotia Institute of Technology. Calender 1988, PP 121-122.

APPENDIX F

LIST OF HIGH TECHNOLOGY FIRMS SELECTED

TO PARTICIPATE IN THE MAIL

1. Scintrex, Ontario
2. Aircraft Appliance & Equipment, Ltd., Ontario
3. DAF Indal Ltd., Ontario
4. Vac-Aero International Ltd., Ontario
5. Hawker Siddeley, Ontario
6. Field Aviation Co. Ltde., Ontario
7. Gassette Canada Ltd., Ontario
8. Canadian Aircraft Products Ltd., Ontario
9. De Havilland Aircraft of Canada Ltd., Ontario
10. Atlas Alloys, Ontario
11. Okanagan Helicopters Ltd., British Columbia
12. Rolls Royce (Canada) Ltd., Quebec
13. CAE Industries Ltd., Ontario
14. Barringer Research Ltd., Ontario
15. Leigh Instrument/Via Teck, Ontario
16. Aviation Electric Ltd., Quebec
17. Abercorn Aero Ltd., Quebec
18. Lucas Industries Canada Ltd., Quebec
19. Canadian Ltd., Quebec
20. Phillips Electronics Ltd., Ontario
21. Lumonics Inc., Ontario
22. IMP Group Ltd., Nova Scotia
23. Hermes Electronics Ltd., Nova Scotia
24. Northern Telecom, Nova Scotia
25. Indal Technologies, Ontario