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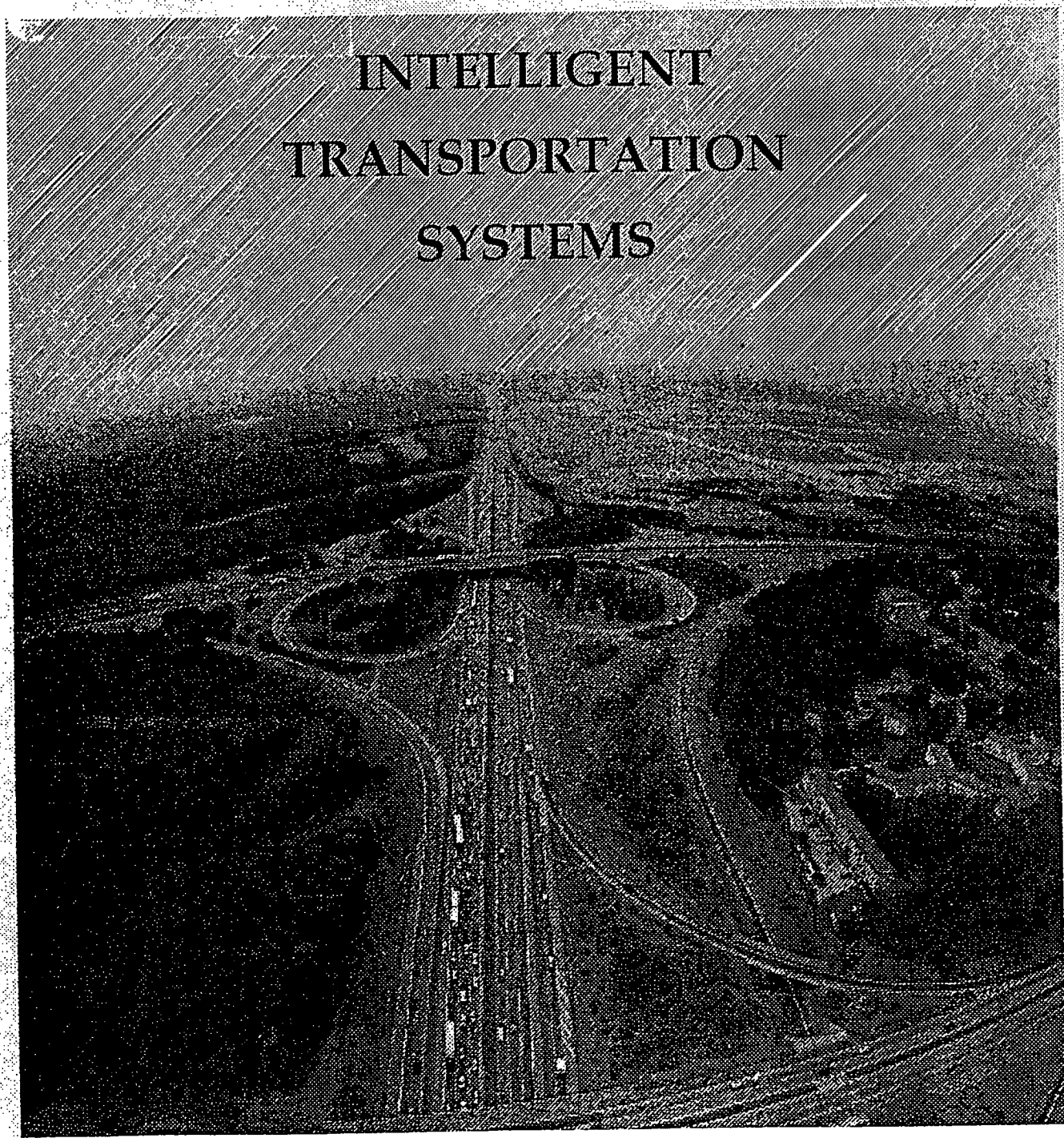
Industry Canada Industrie Canada

INTELLIGENT TRANSPORTATION SYSTEMS



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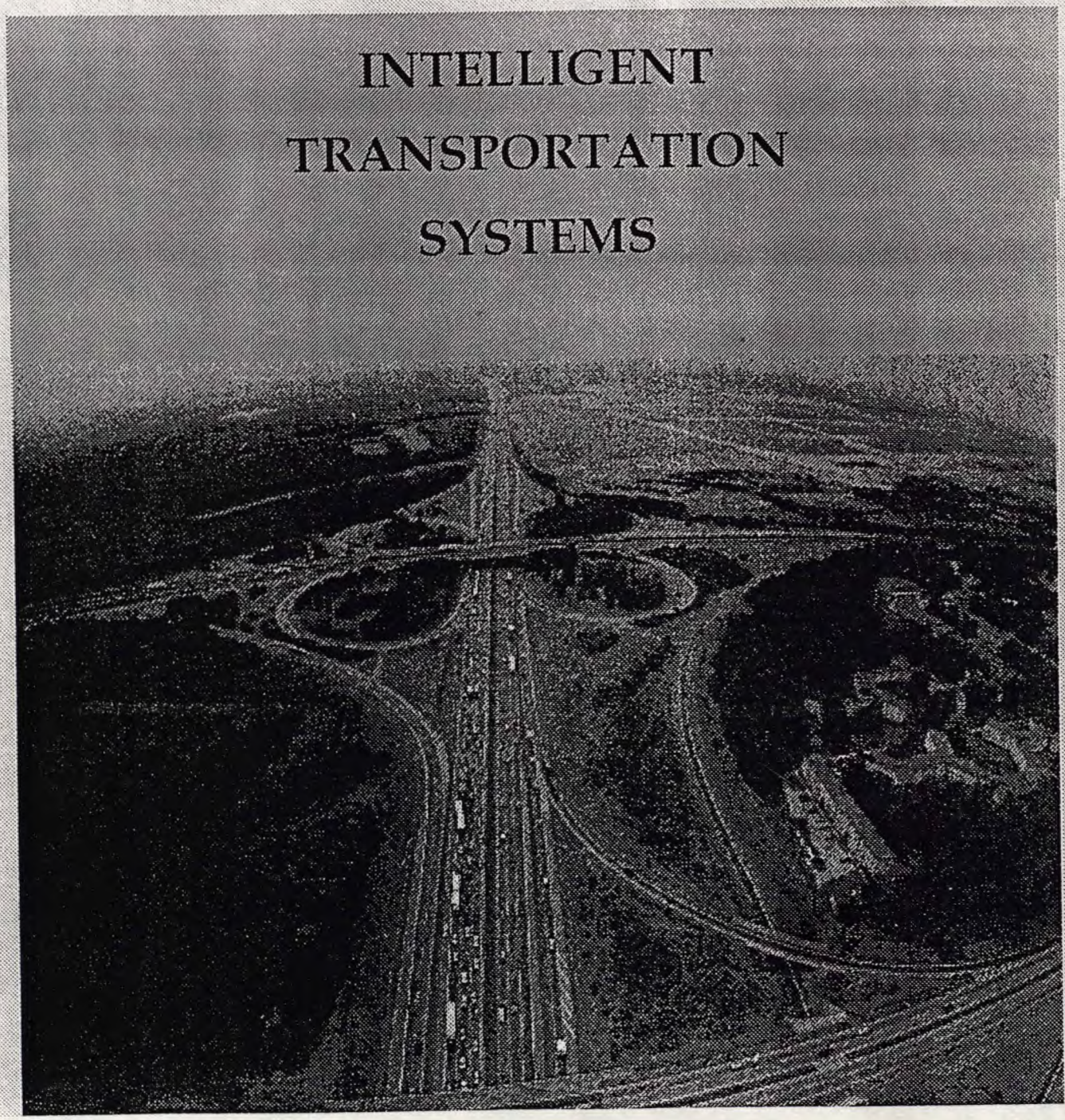

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WHY WE NEED A FOCUS ON INTELLIGENT TRANSPORTATION SYSTEMS

- An emerging industry (world market could reach $1 trillion over next 25 years)
- U.S. technology developments will create large new markets that Canadian companies can access. We have a real comparative advantage in certain market niches
- Companies from space, software/simulation, communications, defence electronics, automotive and other sectors are potential players. This sector crosses all our organizational boundaries and is an ideaal area to test our new sector team approach

WHAT ARE INTELLIGENT TRANSPORATION SYSTEMS?

- ITS is the application of computer technologies, communications and electronics to improve the safety, efficiency and productivity of surface transportation systems, as well as to reduce environmental impacts
- ITS will impact upon the private motor vehicle, mass transit, emergency vehicles and commercial trucking alike
- ITS products already include satellite-based vehicle location and communications systems for trucking, computerized transit management systems, electronic toll collection systems, in-vehicle route guidance and advanced freeway management
- This is an emerging sector, where unlike the others we have studied, the **opportunities for Canadian companies far outweigh the threats**
- Moreover, Industry Canada is currently very well placed to help grow the industry at minimal expense

WHAT WE STUDIED AND WHAT WE KNOW

- Information on U.S. policy and program initiatives was gathered
- 22 companies, representing over 50% of total sector sales, were interviewed
- The sample was distributed across Canada, and included companies in Traffic Management Systems, Traveller Information Systems, Commercial Vehicle Operations and Public Transportation
- Threats and opportunities were identified
- Appropriate government actions were formulated
- We now have a thorough inventory, for the first time, of Canadian company capabilities and how the market is developing in the U.S. and elsewhere

PROFILE OF THE CANADIAN PLAYERS

AND THEIR MARKETS

WHAT OUR CANADIAN COMPANIES DO

- There are six subsectors. Canadian participation in the latter two is minimal
  - *Traffic Management Systems*

    Radar or video sensors, communications systems, controls, and displays for highway surveillance. **Canadians include EIS, Fiberlign, ABL, M3i and others**
  - *Traveller Information Systems*

    Terminals with mobile data interfaces for cellular networks, digital maps. **Canadians include Research-in-Motion, Intergraph, Virtual Prototypes, Bell Cellular**
  - *Commercial Vehicle Operations*

    Weigh-in-motion systems, automatic vehicle location systems; systems for paying tolls and fees at highway speeds; multi-function terminals. **Canadian participants include international Road Dynamics, Mobile Computing, Mark IV, Canadian Marconi and others**

WHAT OUR CANADIAN COMPANIES DO (Cont'd)

- *Public Transportation Systems*

  Transit routing/scheduling/dispatch/ monitoring software, systems for mass transit; mobile communications; computerized character/image systems for airport terminals. **Canadians include Teleride, UMA Systems, Display Systems International and others**

- *Advanced Vehicle Safety Systems* *

  Obstacle detection, collision avoidance, vehicle condition warning

- *Advanced Rural Transportation Systems* *

  Route guidance, incident detection, automatic signalling for emergency response

- Sub-sector profiles, including principal companies and strategic technologies are included in Annex A

* As indicated in Annex D, these two market areas are longer term

LINK TO CANADIAN DEFENCE INDUSTRIES

- For large aerospace/defence companies who have suffered from declining military budgets, ITS offers an opportunity to apply systems integration skills and technologies to an emerging civilian market
- The defence technologies applicable to ITS range from Global Positioning Systems, video/ acoustic/radar sensors, acoustic signal processing, lasers and night vision systems. A more detailed sample is included in Annex B
- The U.S. Defense Conversion Commission studied various options open to the defence industry. It concluded that only ITS offered substantial opportunities

THE PLAYERS AND WHERE THEY ARE FROM

- Most companies have diversified into ITS from a variety of other product or service areas: defence, communications, highway design, mapping, displays, smoke detectors, etc.
- Companies are largely niche oriented
- The major markets are in North America, Europe and Asia
- Approximately 50 companies, including many small to medium enterprises
- Activities centered in Ontario, Quebec, and Western Canada. (Very little activity in Atlantic Canada)
- Products have evolved with little support from Canadian governments
- ITS industrial development falls between the cracks in this department because it involves multiple sectors including defence, telecom, surface transportation and others

HOW THE MARKETS ARE EVOLVING

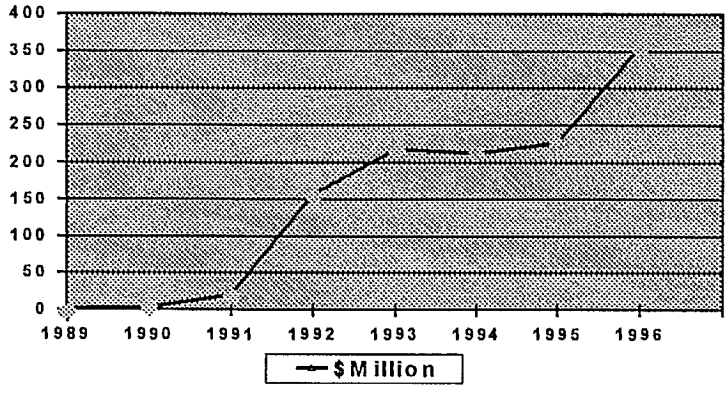
- Traffic Management Systems
  - Canadian companies are exporting to the U.S., Europe, China and other Asian markets
  - Considerable potential for market expansion and entrance of others with new products
  - Systems integrators such as IBI Group are important to growth in Canada's ITS sector
- Traveller Information Systems
  - Some potential for growth, particularly in niche areas, although OEM automobile market could favor high volume producers, possibly including subsidiaries of the automakers
- Commercial Vehicle Operations
  - Canadian companies excel in this area, one where there is significant potential for new products or enhancement of existing products such as truck terminals
  - This will require investments in R&D
- Public Transportation Systems
  - Several transit software companies are already well established in the U.S., Europe and Asia
  - There are good opportunities for development of other products to serve this market: e.g. vehicle tracking systems

U.S. AND CANADIAN GOVERNMENT INVESTMENTS

FOREIGN GOVERNMENT INVESTMENT - U.S.

General

- The U.S. government is funding the transfer of a wide range of technologies from military and other laboratories to the private sector
- U.S. expenditures on ITS R&D/testing are shown below



- The U.S. Department of Transportation's 1996 budget request includes $100M to help accelerate deployment of systems

FOREIGN GOVERNMENT INVESTMENTS - OTHER

- European Road Transportation Informatics Program
  - Over $1B invested since 1986 in RTI
- Japanese ITS Program
  - Japan's ITS investments have been sustained over a long period and Japan is the most advanced in the world

CANADIAN GOVERNMENT INVESTMENT

- Canadian government investments are negligible with small technology development support fromTransport Canada, Communications Research Centre, and Natural Sciences and Engineering Research Council of Canada (NSERC)
- Fiscal restraint will reduce activity
- Canada can not match increasing U.S., European, or Japanese industrial and product development subsidies

NEED FOR A FOCAL POINT

- In stark contrast to the U.S. situation, no Canadian departments are focusing on a comprehensive approach for development of the industry
- Transport Canada has established an interdepartmental committee which addresses a number of ITS issues, mainly related to policy and spectrum management. Industry Canada's participation in this forum has been focused on communications standards and domestic ITS projects
- Canadian ITS companies are seeking alliances in order to leverage their development funds and improve market access. Many of these will cross sector lines (as we usually defiine them in Industry Canada)
- There has been limited participation on the part of Canadian government labs

THREATS & OPPORTUNITIES

OVERVIEW OF THREATS AND OPPORTUNITIES

- Threats
  - Definition of ITS architecture and standards for U.S. by four U.S. defense companies will give them a major competitive advantage
  - Canadian companies that gain access to U.S. programs must exploit the technology in the U.S. with the resultant loss of opportunity to expand in Canada
- Opportunity
  - There are opportunities for Canadian companies at the development and production stages to adopt niche market strategies for their products

THREAT - SYSTEM ARCHITECTURE

- Definition of ITS Architecture and Standards for U.S.
  - U.S. defence companies were contracted to do initial studies by the Federal Highway Administration. See Annex C

Impacts

- The companies developing the architecture and standards will have a major competitive advantage in the development of new products for ITS markets
- Canadian companies currently developing products for this emerging market may find that their products will not meet the new U.S. architecture and standards

Government Objective

- Assist Canadian companies to access the necessary technologies and influence the development of the standards

THREAT - SYSTEM ARCHITECTURE (Cont'd)

Tool Kit

- Market Support
  - We are working with Rockwell U.S. and others to identify opportunities for Canadian ITS companies. This proactive approach will be used with other U.S. ITS leaders
- Strategic Information
  - Team with Transport Canada, individual companies and others to develop and maintain a directory of U.S. projects and technology threats.
  - Gather information on new developments by networking with U.S. defence laboratories and companies
  - Encourage Canadian companies with U.S. connections (company or contractual) to access U.S. programs as sub-contractor or secondary team members.

THREAT - PROGRAM TECHNOLOGY ACCESS

- U.S. government laboratories are spearheading the U.S. ITS developments, with additional investments from ATP and TRP
- Canadian companies that gain access to U.S. CRADAs or participate in other programs must exploit the technology in the United States

Example

- **International Road Dynamics** of Saskatoon has two CRADAs with the U.S., under which the company must produce the resultant products in the U.S.

Government Objective

- Seek opportunities for Canadian companies to participate in U.S. programs, through alliances with U.S. companies at R&D level and to retain the resultant production in Canada
- Help Canadian companies leverage their internal R&D investments by facilitating horizontal alliances within and outside Canada

THREAT - PROGRAM TECHNOLOGY ACCESS (Cont'd)

- Improve industry/government laboratory cooperation in Canada

Tool Kit

- Strategic Intelligence
  - Develop and maintain a database of CRADAs
  - Catalogue applicable Canadian federal and provincial research capabilities
  - Determine synergies between industry requirements and research capabilities
  - Facilitate the establishment of industry-facility linkages
- Government Laboratories
  - Encourage government labs to increase R&D in this emerging sector

OPPORTUNITIES FOR CANADIAN NICHE COMPANIES

Opportunity

- Many of the Canadian ITS companies are largely adaptors of technology. Their strength is in how they apply the technology they acquire to products for niche markets
- There is an opportunity for Canadian companies to align themselves with the U.S. companies that are developing technologies e.g. **International Road Dynamics** has an alliance with AT&T, while **Virtual Prototypes** has an alliance with a U.S. university
- There is also an opportunity to form alliances with systems integrators in Canada, the U.S. and elsewhere
- Networking between companies is critical

OPPORTUNITIES FOR CANADIAN NICHE COMPANIES (Cont'd)

- The U.S. experience demonstrates that technology resident in its industry and defence labs can be applied to an emerging civilian market. Canada could well follow this example, but will have to ensure that the market window is not missed

Government Objective

- Maintain Canadian industry's competitiveness in current technologies and/or assist diversification

OPPORTUNITIES FOR CANADIAN NICHE COMPANIES (Cont'd)

Tool Kit

- An initiative to be undertaken by a sector development team, aimed at enhancing Canadian industry's profile, and accelerating development of the sector

Strategic Intelligence

- Enhance directory of Canadian companies/capabilities (ongoing)
- Distribute directories to all Canadian ITS players (underway)
- Identify technologies/capabilities that may have relevance to ITS, and facilitate participation of Canadian defence/other labs

Promoting Alliances

- Continue discussions with Rockwell U.S. concerning potential alliances with Canadian ITS companies, and expand this initiative to include other major U.S. primes

THE WAY AHEAD

THE WAY AHEAD

- We have a unique window to enhance development and growth of the Canadian ITS sector
- Without significant resources, we can still use a combination of our established networks and intelligence sources
- In an evolving market, intelligence offers a high incremental return
- Much preliminary work has been done, but it is time to undertake a coordinated special initiative to ensure this opportunity does not pass us by

- We recommend that the special initiative be lead by the Aerospace Defence Branch
  - Much of the preliminary work has been done there as a result of Rockwell's interest in technology partnering with Canadian companies
  - ADB officers already are linked into the government agencies and major defence contractors who are leading the U.S. thrust
  - Many of the technologies required are resident avionics and simulation firms

THE WAY AHEAD (Cont'd)

Special Initiative

- Undertake a special initiative with selected aerospace/defence, automotive or communications companies
  - Visits, ITS presentations to companies, and industry associations
  - Identifying technologies that companies could exploit in Canada
  - Identifying market opportunities, potential products or alliances with other companies
  - If necessary, push for product mandates in Canada
- Supplier development to
  - Educate systems integrators on the capabilities of domestic suppliers, and encourage increased business ties
  - Foster ties with U.S. firms that have access to U.S. technologies and facilities
  - Identify opportunities for fast growing companies to take advantage of under utilized facilities in other areas of Canadian industry (e.g. electronic assembly)
  - Exploit existing contacts with U.S. defence and companies to develop the sector

THE WAY AHEAD (Cont'd)

- Government Procurement
  - Develop and manufacture products for Canadian requirements that can also be marketed internationally
- Skills and Business Practice Development
  - Promote closer links between companies and interested universities including Royal Military College, Carleton, Concordia, Calgary, Montreal or Victoria
- Government-to-Government
  - Exchange information on company capabilities
  - Obtain details of any upcoming procurements or demonstration projects
  - Identify potential suppliers to provincial governments

THE WAY AHEAD (Cont'd)

- Achieve product mandate transfer to domestic companies
- Participate in new product development initiatives with offshore companies

- R&D Support
  - Determine applicable Canadian federal and provincial research capabilities
  - Facilitate the establishment of industry-laboratory linkages

ANNEX A

INTELLIGENT TRANSPORTATION

SYSTEMS

SECTOR PROFILE

TRAFFIC MANAGEMENT SYSTEMS SUB-SECTOR

- Design, development and manufacture of
  - Radar traffic detectors
  - Fiber optic communications systems
  - Video, digital switching and network management systems
- Principal Companies
  - EIS
  - Fiberlign
  - ABL
  - IBI Group (systems level only)
  - M3i
- Strategic Technologies
  - In-pavement, video and radar sensors
  - Machine vision, landline and cellular communications, displays
  - Incident detection systems

TRAFFIC MANAGEMENT SYSTEMS SUB-SECTOR (Cont'd)

- Forecast
  - Several Canadian companies are performing very well in the U.S., Europe, China and Asian markets
  - There is considerable potential for market expansion and entrance of others with new products. However, several smaller companies are not aware of the direction of the market and size of the opportunity
  - Systems integrators such as IBI Group are important to the Canadian ITS sector

TRAVELLER INFORMATION SYSTEMS SUB-SECTOR

- Design, development and manufacture of
  - Mobile cellular interfaces
  - Geographic information systems, highway design and information management systems
  - GIS systems emergency services, transportation and general public
  - Prototyping tools for evaluating driver/vehicle interfaces through simulation
- Principal Companies
  - Research-In-Motion
  - Intergraph
  - QC Data
  - Virtual Prototypes
  - Bell Cellular
- Strategic Technologies
  - Vehicle location systems with alarm beacon, mobile terminals, digital maps, displays
  - Radio and cellular communications
  - Real-time data fusion

TRAVELLER INFORMATION SYSTEMS SUB-SECTOR (Cont'd)

- Forecast
  - Significant potential for growth in some niche areas
  - OEM automobile market could favor high volume producers, possibly including subsidiaries of the automakers

COMMERCIAL VEHICLE OPERATIONS SUB-SECTOR

- Design, development, manufacture of
  - Weigh-in-motion systems
  - Automatic vehicle location systems
  - Electronic tolling systems
  - Transponders for identification of railway cars
  - Computing/dispatch/fleet information systems for trucks
  - Electronic trip recorders, fuel tax loggers
  - Electronic control systems for trucks
- Principal Companies
  - International Road Dynamics
  - Mobile Computing
  - Mobiltex
  - Mark IV Industries
  - DISYS
  - Centrodyne
  - Pacific Insight
  - Canadian Marconi
  - Canac Microtel (systems integration only)

COMMERCIAL VEHICLE OPERATIONS SUB-SECTOR (Cont'd)

- Strategic Technologies
  - High-speed weigh-in-motion, vehicle location
  - Vehicle identification, electronic payment systems (e.g. smart cards, transponders)
  - Sensors/systems for automatic roadside inspection
- Forecast
  - Canadian companies excel in this area, one where there is significant potential for new products or enhancement of existing products: e.g. terminals for trucks
  - This will require investments in R&D

PUBLIC TRANSPORTATION SYSTEMS SUB-SECTOR

- Design, development and manufacture of
  - Software for transit operations management, planning, scheduling and dispatch
  - Voice announcement systems
  - Computerized character/image systems for terminals
- Principal Companies
  - Teleride Sage
  - Giro Enterprises
  - UMA Systems
  - Display Systems International
  - Interalia
  - Minelec
  - Array Systems
  - Silent Witness

PUBLIC TRANSPORTATION SYSTEMS SUB-SECTOR (Cont'd)

- Strategic Technologies
  - Wireless information transfer, low-rate compressed video, compressed data
  - Multiple access displays
  - Automatic vehicle location
  - Specialized algorithms
- Forecast
  - Several transit software companies are already well established in the U.S., Europe and Asia
  - There are good opportunities for development of other products to serve this market: e.g. vehicle tracking systems

ANNEX B

DEFENCE TECHNOLOGIES APPLICABLE TO INTELLIGENT TRANSPORTATION SYSTEMS PRODUCTS

DEFENCE TECHNOLOGIES

- Links to ITS products include
  - Global Positioning Systems (GPS) Technology: from guidance of missiles to navigation systems to Automatic Vehicle Location Systems
  - Laser target designator technology: from tanks to smart cruise-control systems
  - Radar sensors: from military surveillance, to obstacle warning applications for vehicles
  - Night vision technologies: from military and anti-terrorist activities to improved visibility for drivers
  - Head-up display technologies: from jet fighters, to vehicles
  - Electronic gyroscopes: from missiles, to aircraft, to navigation systems for the automobile
  - Spread spectrum radio: from guidance of torpedoes and covert communications, to transmissions of ITS data

DEFENCE TECHNOLOGIES (Cont'd)

- Mission control system expertise/software: from space centres and military command/ control/communications posts, to highway traffic and transit control/monitoring applications
- Video tracking: from military surveillance, to traffic monitoring
- Acoustic processing technologies: from submarine detection to sensing oncoming vehicles

ANNEX C

U.S. GOVERNMENT/INDUSTRY

PROJECTS

U.S. GOVERNMENT/INDUSTRY PROJECTS

Involving Defence Laboratories

- Lawrence Livermore Laboratories are licensing low-cost radar for home and auto security, as well as a virtual reality position-sensing system
- Sandia National Laboratories are studying availability of sensors for automating current roadside inspection process (driver alertness and cargo condition/securement)
- Los Alamos Laboratories $4.1M CRADA with GM explores using neural networks for control of anti-lock brakes and four wheel steering
- Naval Research Labs (NRL) are working with several companies to explore potential commercial applications for a NRL fiber optics based technology that might be used to guide motorists away from congested areas
- The U.S. Air Force (Wright Labs) are undertaking a cooperative effort with the private sector to identify dual-use technologies with potential applications in ITS

U.S. GOVERNMENT/INDUSTRY PROJECTS (Cont'd)

- U.S. Air Force (Eglin Air Force Base) have performed automotive radar signature analysis and provided other support under a CRADA with TRW's Avionics/Surveillance Group
- The Jet Propulsion Laboratories are involved in technology projects which address collision avoidance sensors, communications, data management, computing

Involving U.S. Agencies, Universities

- Blind Spot Detection (CRADA - Amerigon Inc.)
- Develop performance specs for collision avoidance ($4.6M to Calspan Corp.)
- Define nationwide ITS architecture ($2.7M each to Rockwell, Hughes, Westinghouse and Loral for preliminary work). Rockwell and Loral were selected for Phase 2 work, which will involve funding of $8M ($U.S.) over 18 months
- Human factors design for automated vehicle (Honeywell, University of California)
- Rear-end crash warning (Frontier Engineering)
- Pre-crash restraint deployment (Romeo Engineering and Hitite Microwave)
- Use of Infrared for Vision Enhancement, Crash Avoidance (TRW)

U.S. GOVERNMENT/INDUSTRY PROJECTS (Cont'd)

- Automated Mileage Collection Rockwell/ others)
- Automated Location of Trains (Hughes, Knudsen)
- Wireless Communications & Sensors (TRP $9.2M to M/A-Com and Northrop)
- Automated Highway System, California PATH Program (Hughes Aircraft, Martin-Marietta, G.M. and others) $166M, from U.S. Department of Transport
- Comprehensive collision avoidance (Hughes, others - $12.2M)
- High-Speed FM subcarrier data broadcast for disseminating travel information ($5.5M to IBM, Delco, Seiko)
- Traffic advisory information service for drivers, using FM subcarrier ($3.7M - Scientific Atlanta)

ANNEX D

INDUSTRY RESPONSE

BY

SUB-SECTOR

COMPANIES SURVEYED

- B.C.
  - Canac/Microtel, Silent Witness,Pacific Insight
- Alberta
  - Mobiltex, QC Data, Interalia
- Saskatchewan
  - International Road Dynamic
- Ontario
  - Fiberlign, Mobile Computing, DISYS, EIS, Mark IV, IBI Group, Array Systems, Minelec, Research-in-Motion, Intergraph
- Quebec
  - M3i, Canadian Marconi, Virtual Prototypes, GIRO
- Newfoundland
  - Compusult

TRAFFIC MANAGEMENT SYSTEM SUB-SECTOR RESPONSE

- Some respondents saw the U.S. initiative as a threat, while others see an opportunity to link up with the participants. To compete, in the future, companies intend to focus on their weaknesses in the following technology areas
  - Microwave, antenna technologies
  - Wireless communications
  - Silent server software
  - Global positioning system applications
- Capabilities will be established/improved through
  - Internal development
  - Purchase or licence agreements
  - Joint ventures
- Companies have highlighted the following areas of government support
  - Identify Canadian industry capabilities and opportunities for alliances with other Canadian firms

TRAFFIC MANAGEMENT SYSTEM SUB-SECTOR RESPONSE (Cont'd)

- Provision by department of market intelligence: e.g. further information on U.S. technology initiatives, the projects and the participants
- Help establish marketing or technology alliances with large U.S. systems suppliers
- Support through procurement process (industrial benefits)
- Support through spectrum allocation process
- Technical support from government laboratories, NRC/DND/CRC
- Trade promotion, export financing
- Financial investment (NSERC for undergrad research), if budgets permit
- Further demonstration projects by Transport Canada: e.g. Automatic Vehicle Identification (AVI) for limousines at federal airports
- Acquisitions by Revenue Canada of machine vision (licence plate identification) systems for border crossings, should have Canadian content

TRAVELLER INFORMATION SYSTEM SUB-SECTOR RESPONSE

- Some companies saw the U.S. initiative as a threat, while others felt safe operating in niche areas. To compete in the future, companies intend to focus on their weaknesses in the following technology areas
- Surface acoustic wave devices
- Radio Frequency (R.F.) technologies
- Capabilities will be established/improved through
  - Internal development
  - Purchase or licence agreements
  - Collaborative programs
  - Foreign government program access through international affiliates
- Companies have highlighted the following areas of government support
  - Financial investment
  - Facilitation of joint R&D ventures
  - Provision of department/market intelligence

TRAVELLER INFORMATION SYSTEM SUB -SECTOR RESPONSE (Cont'd)

- Companies have highlighted the following areas of government support
  - Identify Canadian industry capabilities and opportunities for alliances with other Canadian firms
  - Provision by department of market intelligence: e.g. further information on U.S. technology initiatives, the projects and the participants
  - Support through procurement process (industrial benefits)
  - Technical support from government laboratories, NRC/DND/CRC
  - Trade promotion

COMMERCIAL VEHICLE OPERATIONS SUB-SECTOR RESPONSE

- Some respondents saw the U.S. initiative as a threat, while others saw an opportunity to link up with the participants. Most companies in this sub-sector were not aware of the U.S. activities
- The companies intend to focus on their weaknesses in the following technology areas
  - Acoustics
  - Load cell technology
  - Spread spectrum communications
  - RF technologies
  - RF vehicle identification technologies
- Capabilities will be established/improved through
  - Internal development
  - Purchase or licence agreements
  - Collaborative programs
  - Foreign government program access

COMMERCIAL VEHICLE OPERATIONS SUB-SECTOR RESPONSE (Cont'd)

- Companies have highlighted the following areas of government support
  - Access to U.S. government agency programs (CRADAs, TRPs)
  - Identify Canadian industry capabilities and opportunities for alliances with other Canadian firms
  - Provision by department of market intelligence: e.g. further information on U.S. technology initiatives, the projects and the participants
  - Help establish marketing or technology alliances with large U.S. systems suppliers
  - Support through procurement process (industrial benefits)
  - Support through spectrum allocation process
  - Technical support from government laboratories, NRC/DND/CRC
  - Trade promotion, export financing
  - Financial investment

PUBLIC TRANSPORTATION SYSTEM SUB-SECTOR RESPONSE

- To compete in the future, companies intend to focus on their weaknesses in the following technology areas
  - Radar
  - Acoustics
  - Machine vision
  - Global positioning system applications
- These capabilities will be established/improved through
  - Internal development
  - Joint ventures
  - Collaboration with universities
- Companies have highlighted the following areas of government support
  - Identify Canadian industry capabilities and opportunities for alliances with other Canadian firms
  - Further information on U.S. technology initiatives, the projects and the participants
  - Help establish marketing or technology alliances with large U.S. systems suppliers

PUBLIC TRANSPORTATION SYSTEM SUB-SECTOR RESPONSE (Cont'd)

- Support through the procurement process (industrial benefits)
- Support through the spectrum allocation process
- Technical support from government laboratories, NRC/DND/CRC
- Trade promotion, export financing
- Financial investment (NSERC for undergrad research), if budgets permit
- Further demonstration projects by Transport Canada: e.g. Automatic Vehicle Identification (AVI) for limousines at federal airports
- Financial investment

- The transit software companies were largely interested in intelligence and market support

ADVANCED VEHICLE SAFETY SYSTEMS SUB-SECTOR

- Design, development and manufacture of
  - Obstacle detection, obstacle avoidance systems
  - Intelligent cruise controls
  - Drowsy driver monitor
  - Ultraviolet headlights
  - Impaired driver warning, control override
  - Vehicle condition warning
- Principal Companies
  - No Canadian companies as yet
- Strategic Technologies
  - Laser and radar-based sensors
  - Decision-making algorithms
  - Vision-based lane sensors, ultrasonic sensors
  - Passive far infrared imaging
  - Video-based traffic sign recognition
  - Human factors engineering
  - Vision enhancement systems

ADVANCED VEHICLE SAFETY SYSTEMS SUB-SECTOR (Cont'd)

- Forecast
  - This should grow into a sizeable market, but will depend upon what the customer is willing to pay, in that large investments may be required. Some items might become standard equipment on automobiles and would likely be produced by subsidiaries of the automobile producers
  - As the U.S. government policy gives preference for developments that are in the public interest, a large part of the ITS technology initiative addresses safety considerations
  - Canadian companies will largely pursue niche markets

ADVANCED RURAL TRANSPORTATION SYSTEMS SUB-SECTOR

- Design, development and manufacture of
  - Route guidance, incident detection
  - Automatic signalling to emergency response centers
- Principal Companies
  - No Canadian companies as yet
- Technologies
  - Automatic vehicle location using GPS or LEO satellites
  - Wide area radio, cellular, personal comms or satellites
  - Sensors such as strain gauges, accelerometers, etc.
  - Sensors, displays to warn of ice, poor visibility
  - Processing, information fusion via controllers
- Forecast
  - Some items might become standard equipment on automobiles and would be produced by the automobile producers
  - While 65% of U.S. traffic fatalities occur in rural areas, initial demand will be greater in urban areas
  - Good opportunities for primary services providers (telecom companies) and niche products