

# ***Lean Logistics Technology Roadmap***

*A partnership between Industry Canada and Supply Chain & Logistics Canada*



## ***Final Report***

***March 2003***



Industry  
Canada

Industrie  
Canada



Supply Chain & Logistics Canada / Chaîne d'approvisionnement et logistique Canada



Transports  
Canada

Transport  
Canada



Ontario

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Supply Chain & Logistics Association Canada (SCL) is pleased to have partnered with Industry Canada in the Lean Logistics Technology Roadmap (LLTRM) study, a project of real significance to Canada's supply chain industry.

Strongly committed to our mission to advance the supply chain profession in Canada, SCL believes research of this nature will benefit all supply chain players, helping them make important decisions about the technologies they utilize.

The sharing of information that took place among study participants is invaluable; its inclusion in this report will prove advantageous for the entire industry. We are delighted that many of those participants are SCL members, obvious industry leaders.

The results of this study reflect the thoughtful input of all participants and well-organized interaction among them.

Thank you to all who gave time to make this research useful.

Sincerely,

A handwritten signature in blue ink that reads 'Sheryl M. McKean'.

Sheryl M. McKean  
President & CEO

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### **Acknowledgement**

The Lean Logistics Technology Roadmap (LLTRM) was, by design, an industry led initiative sponsored by Supply Chain & Logistics Canada (SCL) and Industry Canada with demonstrated support from Transport Canada and the Ontario Government. The key participants in the collegial exercise are truly noted in Annex 8.1. They represent knowledgeable logistics and supply chain professionals from companies that are seen to be at the forefront of supply chain technological advancement and process excellence. The impressive and steadfast commitment of the Working Group and the Steering Committee lead by James Eckler, was the key to formulating the final report and its resultant action items.

In many ways, the report represents the first opportunity for logisticians and supply chain managers to speak to Government in a collective and organized manner, expressing their unique views on ways to resolve educational, competitive and operational challenges within Canada.

In keeping with the tradition of “lean”, this undertaking was supported and facilitated by a small group of dedicated individuals whose sole interest was to bring forward a set of action items and deliverables for immediate execution.

In this regard, the undersigned would like to pay additional tribute to both Ken White of Acton White Associates and Philippe Richer of Industry Canada. Ken was the co-author with me of the original scoping study that lead to the full Lean Logistics TRM project. Philippe not only provided strong administrative support on behalf of Industry Canada but was also a strong contributor in his own right in support of the intellectual property of the final document.

It was a most rewarding experience to work with such a strong, committed and energetic group of professionals.



J. David Long  
LLTRM Industry Champion

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### ***1 EXECUTIVE SUMMARY***

The Lean Logistics Technology Roadmap (LLTRM) is an industry lead initiative of Supply Chain and Logistics Canada (SCL) with the support of Industry Canada, Transport Canada and the Ontario Government. The report reflects the views of the Steering Committee and the Working Group within the specific selected sectors. It aims to assess technologies, innovations and conditions that have the greatest impact on the logistics sector and to develop an action plan for industry, academia and government.

David Long, former president of SCL, was appointed as industry champion and directed the TRM process and resultant action items. A Steering Committee (SC) was created in November 2002. It was composed of leading supply chain practitioners from human resource management, retail, transportation, manufacturing and academic backgrounds. The SC decided that the initial discussions supporting the TRM should reflect contemporary e-business realities:

- ☒☒ Visibility
- ☒☒ Traceability
- ☒☒ Global Sourcing
- ☒☒ Internet-based Supply Chain
- ☒☒ Skill Requirements
- ☒☒ Small and Medium-Size Enterprises (SME) / Channel Masters Involvement.

A Working Committee (WC) was established with 25 industry members from four sectors: pharmaceutical, retail, manufacturing and transportation. The WC members commenced their activity by completing a supply chain technology application matrix and by attending and participating in a two-day workshop in Toronto in January 2003. Industry members across the country also had the opportunity to contribute to the initiative via two regional consultations held in Eastern and Western Canada, held in March 2003.

Through such a dynamic process, the industry developed key action items that respond to future needs. The SC drove the action items based on analysis and overview of the working committee conclusions. Action items are currently being carefully reviewed and prioritized by the responsible stakeholders noted under each deliverable.

#### **Resulting Action Items And Recommendations From The Steering Committee Based On Working Group Conclusions**

##### **1- Comprehensive Knowledge Source to companies**

Required actions:

- 1.1 Development of an objective source and / or repository of real case experiences that can be shared with the industry and academia.

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- 1.2 Development of clear guidelines for supply chain technology investment for both SME and larger firms.
- 1.3 Development of fundamental guidelines for efficient supply chain technology implementation for SME. The guidelines should focus on the following six elements:
  - ☞☞ Supply Chain Inventory Visibility
  - ☞☞ Demand Planning
  - ☞☞ Web-Based Supply Chain Management
  - ☞☞ Supplier Relationship Management
  - ☞☞ Available to Promise
  - ☞☞ Supply Chain Event Management
- 1.4 Provide guidance on border crossing efficiencies and technology requirements to companies, particularly to SME.
- 1.5 Define and support research initiatives that will create seamless systems and “middleware” for SME.
- 1.6 Create a demonstration project that will allow SME to observe necessary interfaces with third party logistics (3PL) operations.
- 1.7 Apply the SCOR model process in the development of guidelines / toolkit for companies to enhance their internal supply chain procedures.  
☞☞ **Responsibility:** Logistics TRM Working Group and Intergovernmental Committee, Industry Canada, SCL, ECCC, Transport Canada

## **2- Knowledge transfer between industry and government**

Required Action:

- 2.1 Supply chain professionals should increasingly provide guidance to government agencies on border crossing policy issues.
- 2.2 Industry should provide supply chain process perspectives in responding to complex Kyoto imperatives.  
☞☞ **Responsibility:** SCL

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### **3- Supply Chain Information for Decision Making**

Required Action:

- 3.1 Greatly enhance statistical information representing supply chain management.
  - 3.1.1 Ensure that statistical information is captured in existing and new surveys for innovation and regulatory purposes.
  - 3.1.2 Direct Statistics Canada to include logistics as one of the key activities that is monitored and published.
  - 3.1.3 Develop statistical models to track supply chain efficiency and competitiveness in a North American context.

✍✍ **Responsibility:** Industry Canada, Transport Canada, Statistics Canada, CLM (USA) & SCL

### **4- Global Standards & Systems**

Required Action:

- 4.1 Promote the adoption of global e-business standards across all sectors of the supply chain.
- 4.2 Encourage SME to participate in National and global standard forums in order to ensure that their interests are represented.

✍✍ **Responsibility:** ECCC, SCL, Industry Canada, sectoral associations

### **5- Skills Mandates**

Required Action:

- 5.1 Develop an awareness program aimed at the federal government, associations, high schools, colleges, universities, and provinces.
- 5.2 Promotion of a national logistics / supply chain skill strategy that incorporates the following elements:
  - ✍✍ Strategic Planning
  - ✍✍ Process transformation
  - ✍✍ Leadership
  - ✍✍ Optimization
  - ✍✍ Operational Analysis
  - ✍✍ Innovation
  - ✍✍ Project management & information technology implementation
  - ✍✍ Financial / economic analysis
- 5.3 Monitor and apply where appropriate international skill model best practices: France, U. K. and U.S.
- 5.4 Creation of logistics / Supply Chain Management career path guidelines that will help logisticians in their career development.
- 5.5 Promote the establishment of Logistics Chairs through universities.
  - ✍✍ **Responsibility:** Industry Canada, HRDC, Sector Councils, Provinces, Academia, SCL and private sector members

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## **2 INTRODUCTION**

Just to stay even with their competition, businesses are under tremendous pressure to make tangible productivity gains and to hold costs in check. The evolution of a variety of hardware and software technologies is fundamentally changing the economics of supply chain and logistics management. The fast-changing current business environment is becoming increasingly customer-driven, based upon rapid access to information and communications technologies. With the emergence of electronic commerce and integrated logistics management concepts, supply chain management (SCM) and logistics are becoming an integral part of this fast-paced and changing "new economy." New border technology requirements force Canadian small and medium sized enterprises (SME) to be innovative and connected with their trading partners. The new paradigm has resulted in considerable challenges for the Canadian logistics sector. The role of technology in meeting these challenges is paramount.

Technology and markets are changing rapidly and the pace of change is accelerating. Industry needs solutions that address today's pressing needs and tomorrow's vision. Many solutions are beyond the ability of individual firms. Common needs demand leveraged solutions. Successful companies will be those who lead change.

Technology Roadmapping is a planning process driven by the projected needs of future markets. It helps companies to identify, select, and develop technology options to satisfy future service, product or operational needs.

Via the process, companies in a given sector can pool their resources and work together with academia and governments, to look into the future and determine what their specific markets will require. This process is led by industry, and facilitated by government.

Supply Chain & Logistics Canada (SCL) has formed a partnership with Industry Canada to create a Technology Road Map (TRM) related to logistics activity in Canada. The Lean Logistics Technology Road Map (LLTRM) is a forecasting tool that determines future needs and identifies the critical science, technology and research needed to gain strategic competitive advantage. Through the TRM process, companies lever their resources and work with academia and governments to look into the future, in order to try to determine both where their specific needs are going and the critical technologies that will be required. This TRM process is being led by industry, and facilitated by Industry Canada, Transport Canada and the Ministry of Enterprise, Opportunity and Innovation of Ontario.

As benefits, the LLTRM:

- ☞ Provides a consensus view on new market opportunities and critical technologies
- ☞ Identifies major barriers/constraints to future development
- ☞ Guides future R&D investment
- ☞ Promotes the development of leading-edge technologies
- ☞ Identifies critical skills needed

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- ☞☞Increases competitiveness, productivity, and profitability
- ☞☞Encourages the formation of new alliances, networks and partnerships
- ☞☞Reduces the risks of collaboration
- ☞☞Provides direction to align government policies, programs and regulations

### **2.1 LLTRM PROCESS**

#### **The scoping Study, March 2002**

A primary objective of the scoping study was to recommend to Industry Canada and the Industry what areas of logistics and supply chain management should be addressed in the TRM, in order to narrow the field and provide greater focus to the process, when it commences. The lean logistics TRM endeavors to find best practices being employed by industry leaders and the technologies that enable waste reductions. Unlike other TRMs undertaken by Industry Canada, this roadmap is pervasive across industry sectors, allowing both industry and government to discern leading-edge technologies that may have application across traditional sectoral lines.

The scoping study has been conducted through in-depth interviews with key logistics representatives, as well as extensive literature search. The scoping study isolated key global pressures that will be addressed including mass customization, increased competition, globalization, consumer pressures and border (technology & security) issues. Key technologies include internet e-Collaboration models and a wide range of information communication technologies used up and down the supply chain. Key performance measures include inventory turns and quicker deliveries based on a just-in-time environment. Supply chain integration and productivity performance at the firm level are highly interrelated. The scoping study isolated several candidate technologies that should be further reviewed in the next phase of the TRM.

#### **Establishment of a Steering Committee, October 2002**

The mandate of the Steering Committee for the Logistics Technology Roadmap is to provide advice and recommendations to ensure that the resulting roadmap is strategic, relevant and useful to, as well as, actionable by the Canadian logistics players, research community, academia and government. The Steering Committee also ensures that the roadmapping process is carried out in a timely and effective manner. It is composed of leading supply chain practitioners from human resource management, retail, transportation, manufacturing and academic backgrounds (See Annex 8.1 for the members list). The Steering Committee analyzed the observations from the Working Group deliberations and developed appropriate action items for implementation.

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### **Establishment of the working group, November 2002**

The Working Group was created to assess technologies, innovations and conditions that have the greatest impact on the logistics sector and to develop an action plan for industry, academia and government. The Working Group was composed of 25 members from four sectors: pharmaceutical, retail, manufacturing and transportation (See Annex 8.1 for the list of participants).

### **Development of a supply chain technology matrix and TRM thematic**

The discussions for the Road map were focused around the following three questions

- 1) Where are you today?
- 2) What are the drivers of change?
- 3) Where do you need to go?

The questions were raised in the context of the following 5 e-business driver realities that are vital for competitive survival.

- ☞☞ Visibility
  - ☞☞ Traceability
  - ☞☞ Global Sourcing
  - ☞☞ Internet-Based Supply Chain
  - ☞☞ SME Involvement / Cost of Engagement
- (See Glossary in Annex 7.4 for definitions of those specific themes)

Each working group had to fill a supply chain technology application matrix for their specific sector. (See Annex 8.3 for Matrix results)

### **Toronto Workshop & Regional Consultations**

The 4 working groups met for two days on January 15-16, 2003 and developed an action plan for the implementation phase of the LLTRM. Regional Chapters of SCL had the opportunity to review the report and provide critical input to fill some gaps recognized from the Toronto workshop. The regional consultations also provided some regionally specific information to the report in order to reflect a true cross-Canada perspective. Two regional consultations in both Eastern and Western Canada, were conducted in March 2003 (See Annex 8.1 for regional consultations members).

### **3 OVERALL ISSUES FROM THE LOGISTICS TRM**

#### **3.1 SCM INVESTMENT COSTS**

Costs for new investments in hardware and software technologies are often quite substantial and a business case has to be made to justify these high costs. The decision to proceed or not to proceed with a new investment in SCM technology is based on both expected payback (ROI) and strategic considerations concerning the sustainability or the competitive performance of the firm.

Technology improvements must be closely integrated with business process improvements. Technology is an enabler of improved business processes; it is not an end in itself. The link between the SCM technology and the overall strategic objectives of the company are similarly critically important.

The importance of logistics to the overall bottom line cannot be overstated. The way in which logistics technology and business process improvements dovetails with the overall strategic vision of the organization is equally or more important.

The importance of logistics and SCM needs to be sold within the company's senior executive ranks. Beyond ROI, the visionaries in the company need to be sold on the value of logistics and SCM.

#### **3.2 DATA INTEGRITY**

Data integrity, accuracy and completeness are the cornerstone of lean logistics. A very high volume of data is being managed relevant to supply chain management practices within an organization. Data for the retail sector involves hundreds of thousands of SKUs. The critical data elements that must be captured and monitored have to be identified. Manual hand-offs of data are to be kept to a minimum in order to avoid errors in reporting and re-reporting data. There is a zero tolerance for error, especially in critical fields such as health care and pharmaceuticals.

Given the enormous amount of data that must be captured, manipulated and monitored, exception-based reporting for critical fields may be the best approach. The identification of these critical fields for an exception reporting regime are of critical importance.

#### **3.3 INTEROPERABILITY**

Interoperability or seamless communications across a number of disparate systems in real time or near real time is absolutely essential for supply chain management to work both efficiently and effectively. The challenge for many corporations is how to get technology to do this without the need for substantial new capital investments.

Building separate interfaces with each partner and bridging these interfaces seamlessly provides a considerable cost barrier to companies. A need exists for a common language or translation package that will provide the required communication bridges. XML and the Internet may provide this common language.

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E-commerce standards both domestically and globally need to be established. In some areas such as pharmaceutical distribution these standards are now evolving (eg. Efficient Consumer Reponse (ECR)).

### **3.4 CROSS BORDER ISSUES**

The fallout from September 11, 2001 has resulted in a crisis for Canadian industries in moving goods across the border to the United States. A virtual border crossing is considered to be a desirable solution.

There is a concern that access to the U.S. border is becoming a serious non-tariff trade barrier, especially due to the emergence of the Homeland Security Office and the pending U.S. Container Act.

The U.S. Customs Department implemented new regulations in December 2002 that affect containerized ocean-going cargo bound for U.S. ports of call. The measure is planned to be implemented to all incoming flow to the U.S. territory, including rail, road, air and intermodal transport within the next three years. As a result, shippers, carriers and non-vessel operating common carriers must rapidly adapt to a new business model that favors electronic data transfer, and requires information to be electronically submitted within 4 to 24 hours prior to crossing the border.<sup>1</sup>

Canadian SME that are suppliers of U.S.-based just in time and lean manufacturing clients will have to adopt those new technologies in order to maintain their presence in those specific supply chains. Operation Safe Commerce (OSC) and CT-PAT are the first key measures that have been put in place. They aim at enhancing security throughout international and domestic supply chains while facilitating the efficient cross-border movement of legitimate commerce through the United States.

OSC identifies specific supply chains along particular trade routes and analyze every aspect of the supply chain, from packaging to delivery, for vulnerabilities. Based on their analysis, the ports will propose plans to improve security throughout the supply chain. Finally, these potential solutions to improve container security will be tested in an operating environment for intermodal as well as all flows that will be directed to the United States.<sup>2</sup>

Canadian SME that will be C-TPAT compliant will have to go through different process. Expected process for the next five years are as follow:

1. C- TPAT Application Process
  - 1.1. Conduct self- assessment of company's security according to specified guidelines
  - 1.2. Complete supply chain security profile questionnaire

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<sup>1</sup> United States Department of Transportation

<sup>2</sup> IBID

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- 1.3. Develop enhanced corporate supply chain security program according to feedback from Customs
- 1.4. Explain to Customs how company will self-monitor security
- 1.5. Communication of security guidelines with supply chain partners
- 1.6. Demonstrate acceptable level of trade compliance
- 1.7. CT-Pat Certified carrier and driver

### **2- Technology requirements**

- 2.1. Electronic manifest 4 hour prior to border crossing
- 2.2. Data accuracy audit
- 2.3. Driver: NEXUS card or biometrics
- 2.4. Container: electronic door seal<sup>3</sup>
- 2.5. Truck: CVISN transponder
- 2.6. Traceability and visibility of shipments through the supply chain via RFID

### **3.5 AWARENESS**

Promoting the value of supply chain management to stakeholders both within and outside the corporation is a high priority. Stakeholders include:

- ☒☒ Customers
- ☒☒ Shareholders
- ☒☒ Trading partners
- ☒☒ Suppliers
- ☒☒ Senior executives

### **3.6 CRITICAL SKILLS TECHNOLOGY ADVANCEMENT**

Supply chain managers and logisticians need the following skills and competencies:

- ☒☒ Strategic Planning
  - Horizontal
  - Organizationally within extended SC
  - Cross-functional
  - Industry-wide forward thinking
- ☒☒ Process transformation
  - Understanding
  - Facilitation
  - Change management
- ☒☒ Leadership
  - Team-based environment
  - Matrix management
  - Interpersonal / people
  - Negotiation

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<sup>3</sup> Enabling Secure Trade Forum

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- Relationship management
- ☒☒ Optimization
- ☒☒ Operational Analysis
- ☒☒ Innovation
- ☒☒ Project management & information technology implementation
- ☒☒ Financial / economic analysis
- ☒☒ Data / knowledge management
  - Technical level
  - Global cross functional view
  - Interoperability
  - Strategic functionality

### ***4 KEY FUTURE TECHNOLOGY TRENDS ACROSS THE SUPPLY CHAIN AS DISCUSSED BY THE WORKING COMMITTEE***

#### **4.1 DATA EXCHANGE STANDARDS**

- ☒☒ A bit of an elusive holy grail - except for those that can be dictated by force of economic power by huge global corporations
- ☒☒ "The good thing about standards is that there are so many of them"
- ☒☒ Simply put, universal standards versus content and structure do not exist and the trend is away from rather than towards them
- ☒☒ Technical developments in communication have made electronic document standards less important
- ☒☒ However, basic standards of usage and practice have emerged around the Internet and wireless exchanges at a technical level (HTML, XML, WAP, etc.)
- ☒☒ These facilitate exchanges of data content using structures and formats of convenience

#### **4.2 THE INTERNET**

- ☒☒ A communication channel for a variety of formats;
- ☒☒ Traditional EDI (high volume, any format)
- ☒☒ FTP (formats and contents of convenience)
- ☒☒ Web-forms (low volume, structured input from any device)
- ☒☒ Virtual Private Network (VPN) real-time access to applications from anywhere
- ☒☒ Easily accessible from anywhere; enterprise-to-enterprise, remote dial-up, wireless gateways, more coming via Bluetooth, etc.
- ☒☒ Cheap, redundant (ie; reliable)
- ☒☒ Already accepted by market and users
- ☒☒ Existing tools like browsers, search engines, universal display languages, etc.

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### **4.3 MULTI-DIMENSIONAL BAR CODES**

- ☞☞Such as PDF417 (2 dimensional label) that can encode 1800 ASCII characters
- ☞☞Capable of encoding entire shipment details for billing, customs, routing, etc.
- ☞☞Cheap, easily read, disposable
- ☞☞Poor man's EDI
- ☞☞Key benefit is that it is physically attached to item - the "thing" carries its own data

### **4.4 ELECTRONIC ITEM ID TAGS**

- ☞☞Analogous to the retail store security chips in books, etc. that are detected by scanners at the door
- ☞☞Combinations of integrated circuit, data storage, power supply and antenna will be available soon - on a label
- ☞☞Can be cheaply manufactured for containers, trailers, pallets, individual product units or parts
- ☞☞Passive or active identification (respond when queried - or announce presence)
- ☞☞Encode pertinent item info regarding origin, destination, ownership, components (hazmat codes), routing, movement history
- ☞☞Plus security regarding who can interrogate
- ☞☞Essentially the means for an individual unit to declare what it is, where it is and where it is going
- ☞☞Like 2-D bar codes, the item data is attached to the time - the ultimate in convergence
- ☞☞We can expect these to be integrated during manufacturing at some point soon

### **4.5 WIRELESS CONNECTIVITY**

- ☞☞Constant, seamless access to the web via cellular networks and proximity technologies like Bluetooth
- ☞☞Any device at all can access the web; WAP phone, PDA, ID tags, sensors on trucks, doors, docks, individual products
- ☞☞All will have access to the web or be accessible from the web (thus visible via the web by authorized queries)

### **4.6 DATA CLOUDS**

- ☞☞Like the current web of servers, many will become dedicated to housing shipments and item data and status information
- ☞☞Buyers, suppliers, carriers, customs, etc. will become more inclined to "expose" their status data to the web
- ☞☞Container, pallet and product item tags can easily accommodate security to limit visibility access
- ☞☞Search engines will be used to find anything just by sifting through the web of logistics servers
- ☞☞Easier and cheaper to expose data than to own and share it in exclusive bi-directional relationships
- ☞☞Current internet practices are eroding the data "ownership" biases

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☞☞ Blending a few of these technologies we can expect individual product items to be located via standard web search engines

### **4.7 WEB-BASED APPLICATIONS**

- ☞☞ Business applications such as routing, carrier selection, rating, tracking, customs clearance, billing, etc. will shift to Application Service Provider (ASP) models
- ☞☞ Especially suited for SME's
- ☞☞ Declining value in owning and maintaining these relatively homogeneous applications by individual corporations
- ☞☞ The service and competitive differentiator will become the "how" to use applications as feature / functionality becomes homogeneous
- ☞☞ Software evolution is speeding up even as the applications become less differentiated hence, use of ASP model to stay current

## **5 THE SME NEEDS AND REQUIREMENTS**

The Gartner Group has identified the key supply chain technology that North American Small and Medium sized Enterprises (SME) are planning to implement in the near future.<sup>4</sup> For lower small business, which for our purposes is any business that has 49 employees or less and earns less than \$25 million in revenue annually, investment and resources are the main issue. ***While the IT budget is at 7.5% of revenue, only 0.05% of that budget is spent on supply chain applications.*** For Lower Small Business, (any business that has 50 to 99 employees and earns between \$26 million and \$50 million in revenue annually), ***supply chain applications represent 1.5% of their IT budget and 5% for the mid market businesses.*** SME are faced with limited budget for supply chain applications coupled with their limited skill and technical resources. SME are looking at solutions that has fast Return On Investment (ROI) capabilities, limited risks, short term deployment, easily implemented and, if possible, outsourced or hosted by a specialized firm.

### **5.1 KEY TECHNOLOGY, FEATURES AND FUNCTIONS FOR SME<sup>5</sup>**

#### **5.1.1 Supply Chain Inventory Visibility (SCIV)**

Survey respondents across the board say supply chain visibility is one of their top priorities. These systems let businesses monitor and manage events across the supply chain to pre-empt problems (for example, by sourcing material from another supplier to meet commitments, or by rerouting and rescheduling deliveries dynamically based on customer requirements) and plan activities more effectively. Many let enterprises track and trace inventory globally by line item, but they also submit plans and receive alerts when events deviate from expectations, thereby giving reliable advance knowledge of when goods will arrive. Having this strengthened insight into the status of orders, inventory and shipments across the supply chain have become especially helpful to senior management in refining strategic plans. Discrete manufacturers have recently been outsourcing more of the manufacturing, distribution and service processes of their

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<sup>4</sup> North American SMBs Identify Supply Chain Management Preferences, The Gartner Group, November 2002

<sup>5</sup> Ibid

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businesses, illuminating the need for improved visibility and collaboration. Because of these drivers, visibility solutions (that is, Available to Promise (ATP), Capable to Promise (CTP) and online inventory status) will continue to drive premium price points among SME through 2005.

### **5.1.2 Demand Planning**

Demand planning enhances SME ability to accurately forecast future demand for finished products, key components and subassemblies, as well as spare or service parts. If SME accurately plan for the specific materials, parts and products that will be needed at a given location, and, given time, they can manage inventory levels in a tighter fashion. Hence, demand planning is an area where many SME begin collaborating, and is often the first Supply Chain Planning (SCP) application implemented in a full SCP suite. Impressive results on ROI make it a popular starting point. Most SME still use manual tools such as Microsoft Excel to do demand planning—but these tools lack the forecasting algorithms and analysis capabilities of true demand-planning solutions. Specifically, they should reconcile both recent and historic demand activity, as well as established orders, point-of-sale data and industry forecasts to generate clear graphical overviews of demand by item, location and customer. Another important feature is the ability to publish reports that provide feedback for managers so that they can increase the accuracy of forecasts.

### **5.1.3 Web-Based Supply Chain Management**

Early indicators suggest that preferences for Web-based supply chain solutions will expand significantly in the future. Service providers and vendors that can put together solutions that provide the products, integration and expertise at price points within the grasp of this customer segment are starting to compel attention. This is because many SME do not have the expertise or resources to maintain SCM solutions and fear the perceived service-intensive, disruptive on-site projects required to implement them. When facing demands from their B2B customers for more accurate and timely deliveries, Web-based solutions may be the answer.

### **5.1.4 Supplier Relationship Management (SRM)**

SRM brings a broad, multidisciplined approach to managing suppliers, creating a life cycle view of supply decisions. SRM seeks to deliver business benefits by taking a holistic approach to managing suppliers, linking processes in design and engineering, sourcing, inbound logistics and procurement. SRM includes functions such as supplier performance management, risk and contract management, design collaboration, and other supply-based capabilities. SRM can help users implement pay-on-consumption and volume spending strategies as well as address critical supply proximity issues. One example of a supporting trend is SME moving toward lean manufacturing. Midsize manufacturers have begun negotiating agreements with their key suppliers, so that when a certain inventory level is reached, the system can execute an XML replenishment document to the supplier. The SME market must address the supplier life cycle, which includes design, planning, sourcing, fulfillment and settlement as well as optimizing supplier relationships associated with procuring both direct and indirect goods as well as services and associated human capital.

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### **5.1.5 Available to Promise (ATP)**

ATP is a feature of high interest across smaller manufacturers and of moderate interest among MSB manufacturer/distributors who are probably looking more toward Capable to Promise (CTP) capabilities. ATP simply means that a product is in stock and can be promised to a buyer, as opposed to CTP, which looks at the master schedule to determine the capability to produce a product in a customer's time frame. At the minimum, ATP enables customers or sales reps to book new-finished goods or excess capacity, eliminating unnecessary key-in operations and the potential for human error. The strongest ATP solutions consider inventory, proposed production and order status before providing availability dates. SME should be sure that their solutions are able to calculate ATP by line item based on the required quantity and required date that is entered.

### **5.1.6 Supply Chain Event Management (SCEM)**

SCEM provides alerts to individuals in the supply chain based on predefined alert resolution logic. When events fall outside of a set of parameters determined in SCP, SCEM provides notifications that enable companies to take action with the appropriate SCE application. Notification may be a negative event such as a late shipment or out-of-stock item or an opportunity such as a profitable rush order. Many of the events in supply chain management center on transportation, and, as a result, logistics providers are currently at the forefront of SCEM. However, SCP vendors have also begun addressing SCEM. SME must look at comprehensive and integrated monitoring, notification and response capabilities. The ability to simulate a response to a problem and its impact is also becoming a demanded feature/function but remains visionary among this segment of the market.

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### **6 EDUCATION**

Every dynamic firm is having difficulty hiring Logistics highly qualified personnel. Consulting firms must hire engineers because logistics graduates are not plentiful in Canada. Industry usually has to train future logisticians for a year before they are qualified. The lack of competency is slowing down the development of service providers as well as the capacity of users of logistics to optimize their flows and gain competitive edge.

Some actions have already taken place. The Trucking Sector Council has done significant work in this area over the past year. The Railway Association of Canada has done a major study in partnership with HRDC in this area, covering both rail and the industry at large. The Logistics Institute conducted and published two extensive studies on Labour Market Information in 1997; while a bit dated, they nonetheless lay the path for career mapping efforts currently being undertaken by the Ontario and Alberta Ministries of Education and Learning.

Comparable US-based studies in skills requirements were conducted at Mississippi State University, and published by CLM. This work led directly to the development of the CLM Toolbox [print based and CD Rom], as a training resource in logistics and supply chain management for in-house as well as classroom use.

A significant amount of work has been done by Alberta Learning in this area. The Joint Learning Initiative, a consortium of business and education based in Calgary, has gone a long way to develop resources in support of "Logistics Career Pathways" strategies established by the Alberta Government. JLI and Alberta Learning are developing a 12 module, web-based program in Logistics aimed at Grades 11 and 12; several modules are already being piloted.

The Ministry of Education in Ontario has also identified logistics as a core skills requirement for the secondary school system in the province. Most recently, The Learning Partnership in Toronto has initiated efforts to develop "logistics career path modeling" resources for delivery in web-environments.

The Canadian Foundation for Economic Education [CFEE], with strong connections to the Canadian banking system, has just completed a second series of career path resources in various fields, among which is logistics. The first series focused on entrepreneurship and logistics, and entailed the creation of a skills standard called *Catching the Wave*. The second series is a Vector project that involves videos [interviews + skills map information] on a number of careers; there were several logistics videos produced as part of this series. Both efforts were developed in partnership with HRDC.

WESTAC has just initiated a project to develop a Transportation Blueprint, combining industry needs, skills requirements and career options. They have a partnership with the Van Horne Institute, the University of Calgary, as well as the Joint Learning Initiative referenced above. Transport Canada has expressed a strong desire to work with them in developing this Blueprint.

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Hautes Études Commerciales (HEC) from Montreal has created a distribution research chair, established 5 logistics programs and took part in a logistic skill survey with the Institut de formation en gestion du transport et de la logistique (IFGTL) and Investissement Québec. A sample of other existing and emerging university and college programs (not just courses) would include University of British Columbia, Wilfrid Laurier University, Grant McEwen College and Humber College.

Furthermore, work is being done in the Atlantic Region with the foundation of the Atlantic Institute of Logistics and Transport through the NBCC in Dieppe. The National Research Council's Institute for Information Technology has expressed interest in working with this group and other industry bodies. They are looking to focus on the use of information technology in various sectors, including education and business, and are interested in the area of logistics and supply chain as a sectoral case.

SCL has initiated a comprehensive and detailed accreditation program that is in place to both guide and assess future logistics and supply chain programs. Humber College has been the first college reviewed and has received full accreditation.

All these examples indicate that a significant amount of work has been done in career and skills mapping in logistics and supply chain management. This work forms the foundation for even more significant developments in training resources and programs aimed at schools, colleges and universities. A comprehensive national strategy is needed to build on what has been done in the past, best practices from other countries and move rapidly into the future.

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### **7 RESULTING ACTION ITEMS AND RECOMMENDATIONS FROM THE STEERING COMMITTEE BASED ON WORKING GROUP CONCLUSIONS**

#### **1- Comprehensive Knowledge Source to companies**

Required actions:

1.1 Development of an objective source and / or repository of real case experiences that can be shared with the industry and academia.

1.2 Development of clear guidelines for supply chain technology investment for both SME and larger firms.

1.3 Development of fundamental guidelines for efficient supply chain technology implementation for SME. The guidelines should focus on the following six elements:

- ☞☞ Supply Chain Inventory Visibility
- ☞☞ Demand Planning
- ☞☞ Web-Based Supply Chain Management
- ☞☞ Supplier Relationship Management
- ☞☞ Available to Promise
- ☞☞ Supply Chain Event Management

1.4 Provide guidance on border crossing efficiencies and technology requirements to companies, particularly to SME.

1.5 Define and support research initiatives that will create seamless systems and “middleware” for SME.

1.6 Create a demonstration project that will allow SME to observe necessary interfaces with third party logistics (3PL) operations.

1.7 Apply the SCOR model process in the development of guidelines / toolkit for companies to enhance their internal supply chain procedures.

☞☞ **Responsibility:** Logistics TRM Working Group and Intergovernmental Committee, Industry Canada, SCL, ECCC, Transport Canada

#### **2- Knowledge transfer between industry and government**

Required Action:

2.1 Supply chain professionals should increasingly provide guidance to government agencies on border crossing policy issues.

2.2 Industry should provide supply chain process perspectives in responding to complex Kyoto imperatives.

☞☞ **Responsibility:** SCL

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### **3- Supply Chain Information for Decision Making**

Required Action:

- 3.1 Greatly enhance statistical information representing supply chain management.
  - 3.1.1 Ensure that statistical information is captured in existing and new surveys for innovation and regulatory purposes.
  - 3.1.2 Direct Statistics Canada to include logistics as one of the key activities that is monitored and published.
  - 3.1.3 Develop statistical models to track supply chain efficiency and competitiveness in a North American context.

☞☞ **Responsibility:** Industry Canada, Transport Canada, Statistics Canada, CLM (USA) & SCL

### **4- Global Standards & Systems**

Required Action:

- 4.1 Promote the adoption of global e-business standards across all sectors of the supply chain.
- 4.2 Encourage SME to participate in National and global standard forums in order to ensure that their interests are represented.

☞☞ **Responsibility:** ECCC, SCL, Industry Canada, sectoral associations

### **5- Skills Mandates**

Required Action:

- 5.1 Develop an awareness program aimed at the federal government, associations, high schools, colleges, universities, and provinces.
- 5.2 Promotion of a national logistics / supply chain skill strategy that incorporates the following elements:
  - ☞☞ Strategic Planning
  - ☞☞ Process transformation
  - ☞☞ Leadership
  - ☞☞ Optimization
  - ☞☞ Operational Analysis
  - ☞☞ Innovation
  - ☞☞ Project management & information technology implementation
  - ☞☞ Financial / economic analysis
- 5.3 Monitor and apply where appropriate international skill model best practices: France, U. K. and U.S.
- 5.4 Creation of logistics / Supply Chain Management career path guidelines that will help logisticians in their career development.
- 5.5 Promote the establishment of Logistics Chairs through universities.

**Responsibility:** Industry Canada, HRDC, Sector Councils, Provinces, Academia, SCL and private sector members

## 8.1 COMMITTEE MEMBERS

### *Steering Committee Members*

- ☒☒ Jim Eckler, Progistix-Solutions Inc, Chairman*
- ☒☒ Patrick Cain, Chair of SCL Research Committee*
- ☒☒ Bryan Cox, Source Medical*
- ☒☒ Victor S. Deyglio, The Logistics Institute*
- ☒☒ Doug Doust, Wal-Mart Canada Corp*
- ☒☒ Dr. Fraser Johnson, University of Western Ontario*
- ☒☒ David Long, Logistics TRM*
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- ☒☒ Sheryl McKean, Supply Chain & Logistics Canada*
- ☒☒ Philippe Richer, Industry Canada*
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- ☒☒ Brian Death, J.D. Smith and Sons Limited*
- ☒☒ Dan Goodwill*
- ☒☒ Craig McLean, UPS*
- ☒☒ Bill Patterson, Assured Logistics*
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*☒☒Greg Doyle , Home Depot*  
*☒☒Monique Kack, Grand & Toy*  
*☒☒Stephan Lauzon, Triumvirat Groupe Conseil Ltée*  
*☒☒John Lett*  
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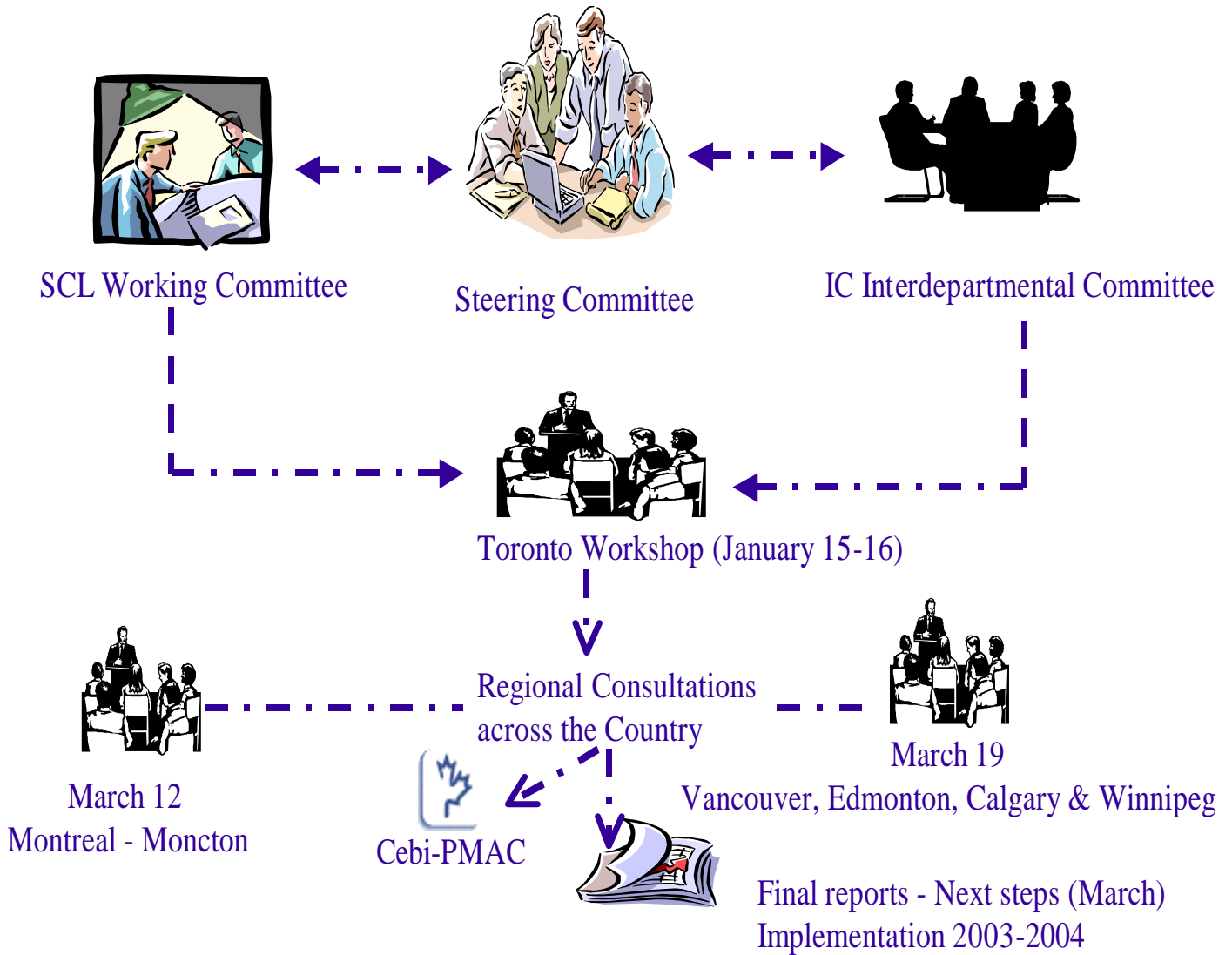
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**8.2 PROJECT TIMETABLE**



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### 8.3 Supply Chain Technology Matrix

#### Pharmaceutical Supply Chain Technology Matrix

<b>Operating Systems</b>	<b>Planning Systems</b>	<b>Event Management / Visibility Systems</b>	<b>Integration Systems</b>	<b>Collaboration Systems</b>	<b>Automation Systems</b>
Enterprise Resource Planning (ERP)	Enterprise Resource Planning (ERP)	Web Based Order Status, Inventory, Receipt & Shipment	Electronic Catalog (internal & external) / Catalog Management	Internet market places / e-procurement Systems	Enterprise Resource Planning (ERP)
Warehouse Management System (WMS)	Advanced Planning and Scheduling (APS) / Forecasting Applications	Data Mining / Reporting / Warehousing	Web based ordering systems: customers for Hospital and Pharmacy	Electronic Catalog (internal & external)	Warehouse Management System (WMS)
Transportation Management Systems (TMS)	Transportation Planning System / Routing Optimization	ASI/CSI (Cart & Part Management Systems)	Data Exchange Environment	Data Mining / Reporting / Warehousing	Document Imaging Systems (customs)
Smart Stream	Warehouse Simulation / WMS Advanced Planning	Custom broker status	EDI	Internet Based Factory / Partners Collaboration	Environmental Monitoring and Data Capture
Point of Sale Systems	Network Modeling / Capacity Modeling	Sales Assortment Planning	Enterprise Application Integration (EAI)	Customer Relationship Management (CRM)	
Billing Systems		ERP / WMS		Online Auction and eRFP	

Legend: **Blue = Industry Wide Used**      **Green = Commonly Used**      **Red = Infrequently used**

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## Manufacturing Supply Chain Technology Matrix

<i>Operating Systems</i>	<i>Planning Systems</i>	<i>Event Management / Visibility Systems</i>	<i>Integration Systems</i>	<i>Collaboration Systems</i>	<i>Automation Systems</i>
Enterprise Resource Planning (ERP - Procurement, Billing...)	Demand Planning	In-transit Visibility for Freight Movement	Multi Protocol Integration System	Notes Applications and DB (document, product & transportation planning)	Barcode and RF
Warehouse Management System (WMS)	Supply Planning	Track and Trace Web Site with 3PL	EDI / FTP	Net Meeting Applications	
Transportation Management System (TMS)	Advanced Planning Systems	Supply Communication System (Partner Information)	Partners WMS / Freight Payable	EDI / FTP	
Fleet Management System (YMS)	Transport Planning: Routing, Load, Modeling	Interactive Content Report Writer		Vendor Managed Inventory	
Order Management System (OMS)	Warehouse Simulation / WMS Advanced Planning			CPFR	
Shop Floor Control System for Routing & Traceability in MFG	Network Modeling			Web-Based Private Exchange	
Design for Manufactureability Systems	Rebate / Pricing Planning				
Global Parts Database					
Global Engineering Database for BOM & Rev Control					

Legend: Blue = Industry Wide Used      Green = Commonly Used      Red = Infrequently used

## Transportation Supply Chain Technology Matrix

<i>Operating Systems</i>	<i>Planning Systems</i>	<i>Event Management / Visibility Systems</i>	<i>Integration Systems</i>	<i>Collaboration Systems</i>	<i>Automation Systems</i>
Transportation Scheduling System	Logistics Network Modeling	Real Time Event Reporting to Customers	Order Management System	Enterprise Resource Planning	Warehouse Management System
Warehouse Management System (WMS)	Enterprise Resource Planning	Enterprise Resource Planning	Electronic Data Interchange	Transportation Modeling System	Order Management System
Fleet Management System	Warehouse Management System	Transportation Modeling System	e-Bill	Demand Planning	Transportation Modeling System
Electronic Data Interchange	Demand Planning	Supply Chain Event Management System	Transportation Modeling System	Supply Planning	CCO (Internet based asset planning)
Bill	CCO (internet based asset planning)	Warehouse Management System		CCO (Internet based asset planning)	Switch, Release, Order
Enterprise Resource Planning (ERP)		CCO (Internet based asset planning)		e-Bill	e-Bill
				Real Time Event Reporting to Customers	

Legend: Blue = Industry Wide Used      Green = Commonly Used      Red = Infrequently used

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## Retail Supply Chain Technology Matrix

<i>Operating Systems</i>	<i>Planning Systems</i>	<i>Event Management / Visibility Systems</i>	<i>Integration Systems</i>	<i>Collaboration Systems</i>	<i>Automation Systems</i>
Enterprise Resource Planning (ERP)	Enterprise Resource Planning (ERP)	Enterprise Resource Planning (ERP)	Enterprise Resource Planning (ERP)	Internet-based Factory / Partners Collaboration	Enterprise Resource Planning (ERP)
Warehouse Management System (WMS)	Distribution Requirements Planning	Customer Relationship Management (CRM)	Warehouse Management System (WMS)	Web-based Private Exchange	Warehouse Management System (WMS)
Transportation Management Systems (TMS)	Supply / Demand Planning	Sales Assortment Planning	Transportation Management Systems (TMS)	Transportation Management Systems (TMS)	Transportation Management Systems (TMS)
Order Entry / Shipping	Transportation Planning System / Routing Optimization				
Point of Sale Systems	Customer Relationship Management (CRM)				
Voice Selection	Warehouse Simulation / WMS Advanced Planning				
Customer Relationship Management (CRM)	Network Modeling / Capacity Modeling				

Legend: Blue = Industry Wide Used      Green = Commonly Used      Red = Infrequently used

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### **8.4 Glossary**

**Advanced Planning and Scheduling (APS):** Software package for planning the physical flows between supplier and producer from data generated by each of the actors.

**Application Services Provider (ASP):** Business of offering online computing applications for a fee. The software package vendor or computer services company offer a number of complementary services that support the implementation and use of the application subscribed to.

**Collaborative Planning and Forecasting Replenishment (CPFR):** Trademark registered by the VICS (Voluntary Interindustry Commerce Standards) in 1996 designating an approach of collaboration and integration of the forecasting and planning processes between customers and suppliers.

**Continuous Improvement (KAIZEN):** From the Japanese “KAI” change and “ZEN” good (for better). Applied to a company, Kaizen is an approach of encouraging participation of all employees, whatever their hierarchical level, for the maintenance of work standards and for their progressive and continuous improvement.

**Continuous Replenishment Program (CRP):** Inventory management approach based on collaboration between manufacturers and distributors developed as part of Efficient Customer Response.

**Customer Relationship Management (CRM):** marketing approach to maintain loyalty of a company’s customers by means of human resources, technological resources and financial resources in order to maintain, update, and interpret all data related to a customer or a prospect, and automate marketing tasks and manage relations with customers.

**Customs Trade Partnership Against Terrorism (C-TPAT) program:** In order to develop, enhance, and maintain effective security processes throughout the global supply chain, U.S. Customs accept applications in various international supply chain categories.

**Data Integrity:** The condition that exists when data is unchanged from its source and has not been accidentally or maliciously modified, altered, or destroyed. The condition in which data are identically maintained during any operation, such as transfer, storage, and retrieval. The preservation of data for their intended use. Relative to specified operations, the a priori expectation of data quality.

**Datamining:** Computer application that automatically structures, analyses and interprets data stored in the data warehouse to provide value-added information that supports the company’s decision making process.

**Distribution Resource Planning (DRP):** Method of calculating the item quantities to be produced, for a given distribution network and period, and of defining, on this basis the necessary logistics and financial resources.

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**EAN-UCC System:** Set of automatic identification tools that facilitate producer-distributor exchanges, distributed in different countries through domestic associations.

**Efficient Consumer Response:** Co-operative approach between manufacturing companies and distributors with the objective of increasing customer satisfaction while improving the economic performance of the participating companies. ECR aims to optimise restocking of sales outlets and to improve the performance of promotional activities using specific techniques: communication modes, management systems and activity bases costing.

**Electronic Data Interchange (EDI):** Exchange of formatted data between the different applications of the partners computer systems. This exchange is based on use of common languages and use of telecommunications channels.

**Electronic Marketplace:** Electronic communication platform enabling companies to communicate with their partners to facilitate business transactions and optimise economic performance.

**Enterprise Application Integration (EAI):** Tools and methods to enable exchanges between applications not initially designed to communicate with each other. Based on modelling of application interaction, EAI translates data into a form usable by the receiving application and routes it to the right destination through the use of middleware.

**Enterprise Resource Planning (ERP):** Computer application integrating all information flows to do with management of the different corporate functions.

**E-Procurement:** Use of Internet technologies to manage purchasing and procurement.

**Free and Secure Trade (FAST) program:** The Free and Secure Trade (FAST) program is a joint Canada-U.S. initiative involving the Canada Customs and Revenue Agency, citizenship and Immigration Canada, the United States Customs Service, and the United States Immigration and Naturalization Service. FAST supports moving pre-approved eligible goods across the border quickly and verifying trade compliance away from the border.

**Global Sourcing:** Industry consolidations through mergers and acquisitions, technology advances, restructured trade zones and a dramatic change in globalization focus by the large trans national organisations has resulted in major changes in procurement policy. This has created a major transformational force of change on the future supply chain.

**Internet Based Supply Chain:** The internet provides the technical capability for a low cost communication solution to online access to real time supply chain information across all parties in the supply chain. This capability will allow companies to collaborate and share business processes and information beyond the four walls of a corporation.

**Lean Concept:** Lean manufacturing model developed initially by the engineer Taiichi Ohno at Toyota which consists of monitoring and controlling the production system to eliminate all

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sources of waste, in particular related to intermediate stocks and poor quality. Production is thus equal to demand at all stages of the process.

**Logistics Chain Event Management (SCEM):** Management approach based on considering events that trigger, interrupt, suspend or modify the movement of flows. It is based on a computer application, developed by the American firm , AMR Research, to direct, alert, simulate, track and measure activities making up the logistics chain.

**Radio Frequency Identification Devices (RFID):** Connection of single object to the internet through a wireless address and a unique identifier. RFID network will provide a means to feed reliable, accurate, real-time information into the existing business applications. It is expected to usher a new are of innovation and opportunity.

**SCOR Model:** Process reference model developed by the Supply Chain Council as the cross industry standard for Supply Chain Management. It integrates the concepts of business process reengineering, benchmarking and process measurement into a cross functional framework.

**SME:** Small and Medium sized Enterprises (SME)<sup>6</sup>. Any business that has less than 99 employees and earns between less than \$50 million in revenue annually.

**Supply Chain Management (SCM):** Approach to managing and synchronising all the processes enabling one or more customer / supplier systems to take into account and respond to expectations of the end customers (from supplier to the customer of the customer). This approach is designed to increase the value created for the customer and improve the economic performance of the participating companies.

**Synchronous flow:** Flow management model coordinating the supply of different components according to their order of use in the production line. This management model delivers the right quantities necessary to the different workstations at the latest possible time.

**Traceability & New Requirements for N-Tier Tracking:** September 11 has hastened the demand for full tracing and tracking capabilities that will be felt across all industries. There will be a resulting significant infrastructure cost for implementation of Global Standards for Identification and business processes both outside and inside borders.

**Value-Added Network:** Computer network connecting different stations (for example, point of sales terminals, onboard terminals, etc.) Through the integration of data, it enables valuable information to be produced for decision making.

**Visibility / Supply Chain Transparency:** The leading organisations are now demanding the capability to look into supply chain real time to assess what is in production queue, what is in warehouse, what is on trucks for logistics and procurement decision making.

**Workflow:** Generic term designating software for managing a process.

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<sup>6</sup> North American SMBs Identify Supply Chain Management Preferences, The Gartner Group, November 2002

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### **8.5 ONLINE RESOURCES**

#### **Supply Chain & Logistics Canada (SCL)**

SCL is a non-profit organization of business professionals interested in improving their logistics and/or distribution management skills.

<http://www.infochain.org>

#### **Lean Logistics Technology Roadmap (LLTRM)**

The Lean Logistics Technology Road Map (LLTRM) is a forecasting tool that determines future needs and identifies the critical science, technology and research needed to gain strategic competitive advantage.

<http://www.infochain.org/roadmap>

#### **Electronic Commerce Council of Canada**

A non-profit, business-led association that promotes and maintains global standards for the identification of goods, services, locations and related e-commerce communication.

<http://www.eccc.org>

#### **SourceCAN**

A single, harmonized business portal that provides organizations with business opportunities and the tools needed to conduct business on the Web.

<http://sourcecan.ca>

#### **Logistics Web-Visibility Tool Kit**

The Toolkit is a step-by-step guide to adopting Web-Visibility, with useful references to best practices, journals and other resources.

<http://www.infochain.org/roadmap>

#### **Canadian Resource Guide to High Performance Manufacturing**

Industry Canada's guide to finding the tools, people, and resources to improve manufacturing performance. The site includes lean consortiums, specialists, associations and educators .

<http://strategis.gc.ca/lean.manufacturing>

#### **Retailinteractive.ca**

A pipeline to practical, hands-on business information, resources and tools designed especially for Canadian retailers.

<http://retailinteractive.ca>

#### **Ebiz.enable**

Canada's e-business portal, Ebiz.enable has consolidated the information companies need to make key e-business decisions.

<http://strategis.ic.gc.ca/ebizenable>