Port of Montreal Extranet Design

Prepared for
Transportation Development Centre
Safety and Security
Transport Canada

BCE
Emergis

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EXECUTIVE SUMMARY

Background

The Transportation Development Centre (TDC) and the Port of Montreal (POM) have joined forces on an intermodal technology project designed to improve the efficiency and productivity of container movement through the Port. The current emphasis is on the terminal-truck interface, although it will later be expanded to all modes of transport. The project is part of a larger program designed to achieve fully integrated electronic document interchange among the Port's trading partners and other stakeholders through the implementation of Internet-based technology.

In this context, TDC has awarded a contract to BCE Emergis for the detailed design specifications of an Extranet for the Port of Montreal community. The Extranet solution was identified in a previous study (TP 13531E) conducted by GE Information Services Canada for TDC. By taking advantage of the Internet's flexible electronic data exchange capabilities, the Extranet will enable EDI-capable Port stakeholders to communicate with non-EDI trading partners, using the Internet as a communication gateway. The Extranet system advocates the use of open architecture and "best-of-breed" software solutions.

The specifications found in this design outline of the Port of Montreal Extranet are sufficiently detailed to be used to develop and implement a full production system.

Scope, Approach and Methodology

Two committees were created to fulfill the mandate: the Steering committee, composed of executive personnel from the Port of Montreal, terminals in the Port, and a logistics company, which validated the orientation of the study and helped the Project Committee to identify key players from whom to obtain information and validate the business workflow process; and the Project committee, consisting of an expert in transportation systems technology from TDC and two members of POM's IT department and BCE Emergis's IT division.

A four-step approach was used to write the specifications for the Extranet:
- Review the previous study conducted by GE Information Services Canada based on a series of interviews with various Port stakeholders and finalize the scope of the project with TDC and POM.
- Develop a list of prototype screens for the final program and validate these screens by conducting several interviews with freight forwarders, Canada Customs, transport companies, terminals, shipping lines, and logistics companies. A total of nine different stakeholders were consulted to validate these screens, with some stakeholders meeting up to three times.
- Design the Extranet itself based on the finalized screens, business workflows, and constraint highlights established with the various stakeholders during our interviews.
- Review the final design with POM's IT group and obtain approval from TDC and the Steering Committee.

The objective of the Port of Montreal Extranet is to allow its members to improve their overall efficiency, especially in the area of gate congestion and truck-terminal interface. Key areas of improvement through implementation of the Extranet are:
1. Improved services to community members and potential end users;
2. Continuous container visibility to all members with appropriate user access;
3. Expanded community participating in the use of electronic commerce;
4. Reduced waiting times at the Terminal Gate;
5. Improved and efficient communication among all members;
6. Fewer data entry errors and paperwork inaccuracies.

From a management point of view, the scope of the project as well as milestones, resources, and budget allocation were established to meet these six objectives.

The report entitled *Port of Montreal Extranet Design* comprises five sections:

- **The Architecture section** describes the infrastructure aspects of the Extranet by presenting the various networks and components required to achieve functionality.

  It details, from a hardware and software perspective, the nature and particularities of the various components of the Extranet, and provides an estimate of the costs involved in building the Extranet according to the specifications described in this report.

- **The Application section** describes all functions required to allow involved stakeholders (shipping lines, terminals, freight forwarders, trucking companies, and various government ministries) to exchange information related to containers. It includes descriptions of screens, information to be supplied, controls to be performed, search functions, container status, batch transactions, alerts, archiving, and reports.

  This section contains sufficiently detailed information for each function and constraint (business rules) to enable the application to be developed. The cost of developing such an application is not included in the analysis and should be provided in response to a future Request for Proposal (RFP).

- **The Database section** describes the central database that holds and maintains all information related to containers. A detailed relational data model that comprises all objects, data elements, relations, lists of tables, and required fields, as well as a glossary of elements are included in this section.

- **The Security section** addresses the security design process for the Port of Montreal Extranet. Security is a recurring process for which there is no unique or perfect solution. In this context, guidelines and recommendations are provided in this section and a threat analysis of the Extranet is conducted to ensure the Extranet is secure at a reasonable cost.

- **The Operations / Service Level Agreement section** details the Service Level Agreement (SLA) Extranet community solution required by the Port of Montreal. The SLA outlines customer support services, the registration process, the escalation procedure, and operating policies. It also defines the nature of the relationship between the Extranet provider and its members, including the roles and responsibilities of each of the participants (end-users, super users, and the Port of Montreal).

In conclusion, **the Orientation and Future Development of the Extranet Functionality** section provides ideas on how the Extranet should evolve in the future.

Limitations and exclusions
As agreed in determining the scope of the project, this Extranet design excludes the following:
1. Preparation of partners'/stakeholders' "readiness";
2. Technical integration to Terminal information systems including interface required to create and send data to be stored in the central database;
3. Design of interfaces/modules required to produce reports;
4. Translation maps;
5. Status of containers transported by railway;
6. Management of partial containers.

Results

ARCHITECTURE

Service Level Requirements:
1. 24x7 availability and monitoring;
2. 98.5% uptime;
3. 8:00 to 18:00 Business Office hours;
4. 24x7 Help Desk.

Sizing Requirements:
The sizing requirements of the Port of Montreal Extranet hardware and equipment are based on the observed traffic of at most 1,000,000 containers transiting the port each year.

Performance Requirements:
Because of the rather small and closed community of interests in the Port of Montreal Extranet, at least in its initial stage, and because of the small amount of transactions, it is easily foreseeable that small to medium systems should suffice for the basic requirements in terms of performance.

The community of interest members and the number of users per community has initially been identified as follows:

Community	Estimated number of members (max.)	Number of users (maximum)	Total
Shipping Lines	12	4	48
Terminals	3	4	12
Freight Forwarders and Custom Brokers	25	4	100
Trucking Companies	25	4	100
Total	65	4	260

Estimated Number of Community Members

Infrastructure:
The Port of Montreal Extranet is a secure and highly available network, featuring the latest technology to better serve its users. Based mainly on Windows 2000 technology with Active Directory Server for resource control and access, it offers an integrated solution for user management along with security features that may cover both the application and data levels.

The core system is an all Windows 2000 solution on Compaq hardware, offering the following advantages: ease of administration, widespread technology, and seamless integration of the different components. Cisco and Nortel equipment are used for telecommunications needs. Sun hardware and a UNIX operating system are used for firewalls and console because of their reliability. HP hardware with an HP-UX operating system using HP Open View is used for monitoring purposes.

APPLICATION

Several stakeholders are involved in Container manipulation at the Port of Montreal:
1. Port of Montreal;
2. Shipping Lines;
3. Terminals;
4. Freight Forwarders / Logistics Companies;

5. Trucking Companies;
6. Various Government Departments.

Here is a list of some important functions available to stakeholders in order to provide or retrieve container information:

- Shipping Lines to Provide Voyage Description;
- Shipping Lines to Provide Bills of Lading, including all corresponding Containers and their descriptions for import;
- Freight Forwarders to Assign Trucking Company to Container;
- Freight Forwarders will be able to Manage Empty Memos, used mostly in the Export process to provide information on where to pick up empties and what the pickup requirements are;
- Freight Forwarders or Trucking Companies to Provide Bills of Lading to the Extranet for the export process;
- Terminals to provide all Changes to Container Status to the Extranet, including all releases for the import process;
- Trucking Companies to Assign Truck Driver to Container;
- Trucking Companies to Manage Drivers to keep information related to their drivers in the Extranet;
- Trucking Companies will be able to download information from the Extranet to their proprietary systems to produce internal work orders without having to re-enter information;
- Trucking Companies will be able to upload processed information in their proprietary systems to the Extranet (Truck Driver Assignment).

To help stakeholders, the Extranet also includes additional functions such as alerts, which will be sent to specific stakeholders if information changed in the Extranet has a direct impact on them, and reports, which will also be available via a distinct database so as not to affect response time in the production database.
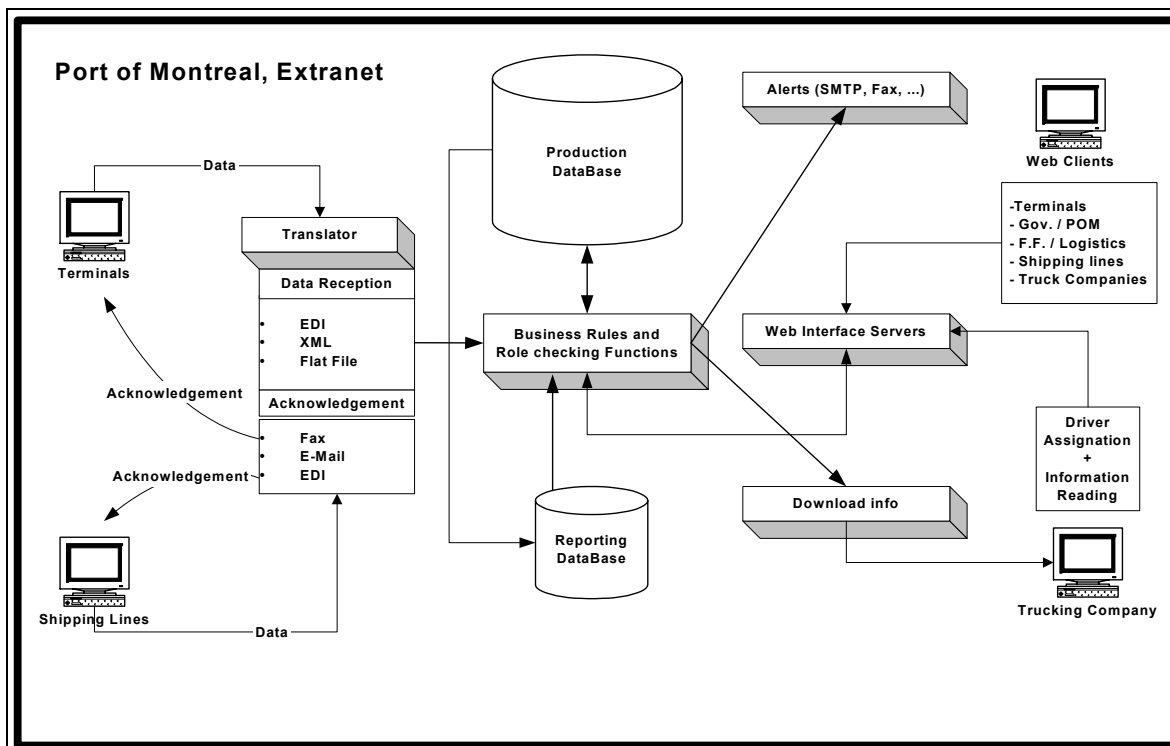
List of screens in the Extranet:
1. Extranet Entry Point
2. Logoff
3. Import Voyage List (Default screen)
4. Export Voyage List
5. Container Detail
6. Manage Empty Memo (Freight Forwarder only)
7. Manage Drivers (Trucking Company only)
8. Import Container List
9. Export Container List
10. Export Voyage List (Export only)
11. Shipping Line Detail
12. Trucking Company Detail
13. Terminal Detail
14. Freight Forwarder Detail
15. Truck Driver Assignment Detail
16. Trucking Company Assignment
17. Container Log
18. Empty Memo Instructions
19. Trucking Orders (Trucking Company only)
20. Bill of Lading (Freight Forwarder only)
21. Download (Trucking Company only)
22. Manage Export Container (Freight Forwarder or Trucking Company)

Example of an Extranet screen: Container Detail - Terminal:

DATABASE

Port of Montreal Extranet Data Model
After determining the business reality of the Terminals, Freight Forwarders, Trucking Companies, Shipping Lines, and Government agencies, the Conceptual Data Model was designed to represent the key business concepts and constraints related to Container status management, in the context of import and export Terminals. A Physical Data Model was then derived to represent the business concepts and constraints in terms of database components. Sybase's Power Designer 7.5 case tool was used to perform these steps and to generate the model for an MS SQL Server 7 or 2000 platform.

This section of the Extranet Design is very complete in terms of details and documentation. It covers all the elements of the database design including:
- Table lists;
- Table columns list;
- Table indexes list;
- Reference list;
- Domain list;
- Business rules list;
- Graphical representation of the physical database tables, relationships and entities.

SECURITY

New security technologies are being developed every day that promise much. They often deliver what they promised, but only cover a portion of the system's security. The challenge when choosing security technology is to find the right combination to achieve:
1. **Equilibrium**: the right protection for all components against threats;
2. **Heterogeneity and integration**: a variety of technologies that ensure a wide range of protection against hackers, work well together, and communicate with each another;
3. **Ease of use**: easy to install and manage for the administrator and, most importantly, the end user;
4. **Monitoring and proactive response**: technology that sends alerts when a problem occurs and is capable of launching a countermeasure or a fix;
5. **Sufficient support**: technology supported by back-end engineers and research teams to monitor emerging threats;
6. **Availability of certified resources:** to ensure independence and access to quality resources;
7. **Cost-effectiveness**: not only in terms of acquisition, but also in terms of manpower and equipment.

Security Requirements
Various groups of stakeholders are involved in the Extranet, and improper or unauthorized access could have undesirable business consequences. A hierarchical structure is therefore necessary to group the different access families. A strictly controlled single logon should give network access only to authorized participants, and within the network, grant application and data access by applying strict business rules.

The security access control process is based on Windows 2000 Active Directory Server Technology, and SSL encryption ensures data confidentiality over the Internet. Combined with the network components described in the Architecture section, the Extranet is well protected against possible threats with respect to previously established criteria.

Making the Port of Montreal Extranet publicly available on the Internet is a desirable feature from both an economical and accessibility standpoint, but improper network security could lead to unwanted

intrusions, causing political damage that could ruin the credibility of the Extranet. The importance of implementing strong security measures should therefore not be underestimated.

OPERATIONS / SERVICE LEVEL AGREEMENT

Details Regarding Extranet Operations and Metrics
The Extranet provider's priority commitments should be to deliver the highest quality service and guarantee a high level of service for all activities over which it has control. To ensure a high level of service and efficiency, operations should be organized to offer problem resolution escalation procedures. A reported problem would therefore become the responsibility of Support Services and be resolved at the appropriate level.

Customer and Support Services should be organized to provide a single point of contact for all stakeholders.

Extranet Provider Customer Service and the Technical Help Desk should be set up with the following characteristics to provide a single point of contact for all stakeholders:
- All standard customer and support services should be offered in both French and English;
- Customer and support services should be equipped with a specific toll-free telephone number accessible throughout North America;
- Agents responding to calls should attempt to classify each call by level of difficulty and call priority, following a custom script and call-routing process;
- The Help Desk should handle all technical requests and activities involved in problem resolution, and be responsible for trouble reporting;
- The Help Desk should initiate escalation procedures when resolution time is not achieved;
- The Help Desk should advise customers at regular intervals of the status of the problem resolution;
- The Business Office should handle all activities regarding registration and billing;
- The Business Office should handle all account information and billing inquiries;
- Technical support should be available on a 24/7 basis (except on holidays) for all components under the Extranet provider's control.

The Service Provider should nominate a Customer Service Manager (CSM), who would:
- Represent the Extranet provider;
- Act as the single point of contact between the super users (primary contacts from the Extranet member community) and the Port of Montreal Administrator;
- Manage the Operations Work Order (OWO);
- Obtain authorizations from the POM Administrator for company eligibility and OWO.

Each member company of the Extranet should nominate a super user, who would:
- Represent the members of the Extranet community (one per company);
- Provide the information required to set up the company's account in the Extranet;
- Authorize access to the Business Office for the company's end users;
- Act as the primary interface with the Extranet provider's CSM, Help Desk, and Business Office;
- Provide first-level support to the company's end users.

The Help Desk and Business Office should submit monthly reports to POM administration to validate SLA metrics and highlight aspects of the Extranet that could be improved. Reports should contain elements such as:
- Total calls received;
- Total calls answered;
- Average Speed of Answer (ASA);

- Average Talk Time (ATT);
- Total tickets opened;
- Total tickets closed;
- Total tickets closed on initial call;
- Number of billing queries;
- Average resolution time;
- Number of customer profile updates (add, modify, delete) received;
- Number of customer profiles created;
- Number of customer profiles modified or deleted;
- Number of Welcome Kits distributed;
- Volume of customer information (user ID, password) distributed;
- Number of problem tickets;
- Breakdown of tickets by problem category (urgent, high, routine) and further breakdown of customer problems;
- Percentage of problems within objectives;
- Percentage of problems surpassing objectives;
- Percentage of repeated problems.

Escalation Procedures

To ensure a high level of service and efficiency, operations should be organized to offer problem resolution escalation procedures. A reported problem would therefore become the responsibility of the Help Desk and be resolved at the appropriate level. Support should be offered beginning at the first level.

Call escalation procedures should be defined and documented. Internal escalation charts describe the vertical managerial and technical escalation levels. These charts must be followed to respect the Extranet provider's commitment with its customers.

ORIENTATION AND FUTURE DEVELOPMENT

As stated earlier, the Extranet application described in the report entitled *Port of Montreal Extranet Design* is the first step toward a fully integrated solution for container management at the Port of Montreal.

New functions can be added to the Extranet application to further improve container tracking and tracing. The following functions will be added to the Extranet application as soon as the current configuration has demonstrated appreciable gains in efficiency and productivity at the Port of Montreal:
- Functions for tracking and tracing containers handled by railway companies;
- Functions for handling several containers per order to carrier, rather than the current one-container-per-order basis;
- Functions to exchange information with other international ports that handle containers destined for POM;
- Integration with smart card authentication for truck drivers, that sends transactions to the Extranet when the driver arrives at or leaves from a specific terminal;
- Functions for electronic container billing and electronic transfer of funds for various stakeholders;
- Functions to view chassis and container images from terminal gate video cameras in order to assess damage and as well as the queuing situation at the gate. Images from highway cameras could also be integrated to provide information to trucking companies;
- Graphical representation of containers (different pictures for regular, open top, high cube, flat, or reefer);
- Integrated OCR line-scan cameras to identify container ID;

- Functions to produce official Extranet reports and documents (e.g., the Terminal Interface Release, documents for customs, etc.);
- Functions to allow trucking companies to acknowledge empty memos. Additional fields on screens could indicate to the freight forwarder that the trucking company has accepted the memo.

Conclusions / Recommendations

The Extranet is an excellent solution for improving information sharing and efficiency at the Port of Montreal. The application is designed to evolve easily by adding new functions and business rules, and has the potential to achieve results in the six key areas targeted to improve overall communication among stakeholders in the Port of Montreal community.

The pilot Extranet implementation should be done with a limited number of carefully selected participants to fine-tune the solution for more general use and minimize end-user frustration. The involvement of senior management and syndicated workers in the implementation of the pilot is a key success factor.

Authorization from shipping lines with regard to information disclosed on the Extranet should be granted as soon as possible.