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# An Asset Management System for School Buildings in Quebec

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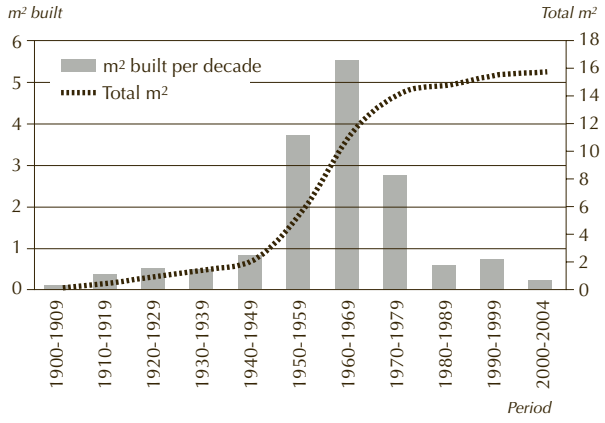
PEB Exchange Programme on Educational Building

# AN ASSET MANAGEMENT SYSTEM FOR SCHOOL BUILDINGS IN QUEBEC

Over the past few years, Quebec school boards have been faced with several problems regarding the management of their building stock. Firstly, an aging building stock which saw most buildings constructed between the 1950s and 1970s signifies that many assets which are either at or near the end of their service life require major renewal (see Figure 1). Furthermore, financial resources are limited because they are only partially adjusted to take into account the needs related to the age of the building stock. Moreover, the retirement of many experienced personnel or managers and the absence of a standardised information system compromises the school boards' knowledge base and their ability to make important strategic decisions regarding the future of their buildings.

Figure 1
**Building stock of Quebec's school boards: Increase in built surface area, by ten-year periods**




For several school boards, these problems make it difficult to effectively prioritise annual renewal activities and maintain a long-term vision in their strategic planning.

In collaboration with the province's school boards, the Ministry of Education decided to implement a state-of-the-art strategic planning tool for both groups' personnel and building managers. Although software cannot rectify the lack of funding for capital renewal, it can at least insure that such funds, however limited, are well spent.

Presented here are the major reasons why an asset management system (AMS) is needed, a brief history of their evolution and a description of the initiative undertaken by Quebec to implement such a system. The appendix contains the recommended basic requirements for an asset management system.

## Why an AMS

An effective asset management system assists building managers in identifying renewal activities and also in presenting stakeholders with accurate information regarding the condition of their building stock and the capital renewal scenarios that lie before them. Their recommendations can then be well supported and pass through the decision process.

Why is an AMS needed now? As we enter a repair and retrofit era (as opposed to a design and build era), building managers face complex decisions regarding the selection, modification and replacement of building assets. Some of the factors that influence these decisions include:

- Changing missions or functions in the building.
- Changing environmental requirements.
- The opportunity to "right-size" over-sized equipment at the end of its service life.
- The impact of energy rate fluctuations and the availability of multiple fuel sources on the selection of heating/cooling plant technologies.
- Changing demographics.

An AMS provides important asset information that allows the building manager to make critical decisions on the evolution of his/her building stock using life cycle costing principles. For example, an AMS can facilitate decisions regarding the replacement of heating or cooling systems because it brings together information about purchase, installation and maintenance costs, as well as taking into account the service life of alternatives and energy performance.

## Evolution of AMS

Contrary to the field of maintenance management, whereby best practice methods have been refined over many decades, today's asset management systems do not offer consistent approaches and features. In fact, until recently, some computerised maintenance management systems were also being offered as AMS simply because they had incorporated the notion of service life.

The first generation of asset management tools such as Dataquire, BUILDER and MAPS came to market in the

mid-1990s. They incorporated basic principles of life cycle costing and contained pre-defined life cycle cost data for common types of building assets. These pioneering tools projected maintenance and capital renewal costs for periods of up to 50 years. They served mainly as benchmarking and performance analysis tools, but were lacking in their capability to manage large asset inventories and to prioritise activities.

This opened the door for the computerised maintenance management systems as a potential asset management solution as they are apt in performing these two functions. However, developers of computerised maintenance management systems (CMMS) quickly realised that transforming a CMMS into an asset management system is much more complex than offering additional customisable fields in their asset inventory modules.

This transformation requires the development of a comprehensive knowledge base of life cycle costing methods, a complete understanding of buildings, and an exhaustive and continuously evolving database of life cycle cost data. Rather than invest in a new field and diversify their activities, most CMMS developers decided to stick to their core business. From this point on, we witnessed a divergence between the providers of asset management systems and computerised maintenance management systems.

Soon thereafter emerged the next generation of asset management systems such as SARRA,[1] RECAPP,[2] VFA.*facility*[3] and Antilope.[4] Although based on different approaches, they all contain life cycle cost forecasting modules, comprehensive work planning features and elaborate condition assessment data management modules.

Today, the importance of sharing common data between stakeholders and the advancement of computer technology have become catalysts for the convergence of asset management systems and computerised maintenance management systems. Since the CMMS is considered by many as the point of entry into a building in regards to asset data, one important trend will be the development of interfaces between asset management systems and computerised maintenance management systems.

1. SARRA (System for Asset Renewal and Resource Allocation) by GES Technologies.

2. RECAPP by Physical Planning Technologies.

3. VFA.*facility* by VFA.

4. Antilope by Socotec.

## Implementing an AMS

Presented below is the approach undertaken by the Quebec primary and secondary public education system and the Ministry of Education in its effort to implement an asset management system that effectively meets the needs of its users. The system will likely be in place in 2005.

1. Form a steering committee to insure that the realities and needs of the school boards as well as those of the ministry are respected.

2. Identify the basic system requirements and its features, such as:
   - User-friendly.
   - Used by all school boards.
   - Useful for all those involved in the management of the building stock for both the school boards and the ministry, given that the school boards are responsible for asset management decisions and the ministry for guidance and financing.
   - Accessible through the Internet.
   - Adaptable to permit the addition of future features and to interface with other software.

3. Determine purchase/development options: It was decided to purchase the licenses of an existing system and to make minor changes to adapt it to the realities and specific needs of the school boards.

4. Meet with firms offering AMS software.

5. Obtain approval to proceed to the implementation phase.

6. Accept a firm's proposal; Quebec chose the firm GRICS (a non-profit organisation owned by the school boards) to:
   - Acquire the licenses of the system (*i.e.* SARRA).
   - Supervise improvements or modifications.
   - Host the system and render it accessible to all school boards and the ministry for an initial cost absorbed by the ministry.
   - Insure maintenance and support.
   - Facilitate the links to other software used by the school boards.

7. Undertake a pilot project.

8. Implement modifications to the system.

9. Establish agreements between the school boards and GRICS.

10. Install software on GRICS servers.
11. Train the school boards and officials in the ministry.
12. Take an inventory of the assets, assess the condition of the building stock and enter the data into the system.
13. Require school boards to input data in phases.
14. Evaluate deferred maintenance. Quebec will carry out this evaluation in 2008, six years after the last quantitative evaluation of the primary and secondary public education building stock. (In 2001/02, deferred maintenance was approximately 8% of the replacement value of the building stock.)

## Recommended Basic Requirements for an Asset Management System

Based on the activities carried out within this project and numerous discussions with building managers, presented below are the basic requirements recommended for an AMS:

***Asset inventory***

As the name suggests, an asset management system shold include complete information on the assets, within an easy-to-update database. It should be based on an industry-recognised classification system such as UNIFORMAT II. A standardised asset inventory becomes the basis for benchmarking, equitable financing, cost forecasting and integrating other work management software and insures that all those who use the system speak the same language.

***Condition assessment***

The system should allow the input of asset condition data such as condition ratings, remaining service life, deterioration curves, deficiencies, corrective measures (cost and year planned), notes, documents, images and prioritisation categories.

***Deferred maintenance***

The AMS should quantify deferred maintenance (renewal and replacement costs that should have been performed to date but have not due to financial constraints or other) and present a breakdown per building and per asset category type (building envelope, heating, ventilation and air conditioning, electricity, etc.). In order to do this, the system should contain a database of pre-defined replacement costs for the most common types of building assets.

***Capital renewal costs***

Based on renewal activities, pre-defined replacement costs and the remaining service life of assets, the system should be able to project capital renewal costs for the long term, for example 25 years. The system should also calculate annual reserve fund allocations and simulate economic parameters such as escalation and current year indexation.

***Work prioritisation and planning***

Once initial cost projections have been performed, an AMS should allow managers to establish their capital plans by prioritising renewal activities based on customisable prioritisation categories (life safety, end-of-life, code compliance, energy, etc.) and key performance indicators such as the Facility Condition Index by the Association of Higher Education Facilities Officers (United States). Moreover, the system should also allow managers to track the status of renewal activities from the time they are approved up to their completion. Renewal activities, which are not approved or not executed, should be carried over automatically to the next year. Information regarding assets, which have been replaced or repaired, is then entered into the system to reflect their new condition.

***Preventive maintenance and repair costs***

In addition to the requirement that the system include a database of replacement costs for the types of assets commonly found in buildings, it should also contain preventive maintenance and repair cost data in order to quantify operating budgets attributed to these important tasks as well as to implement equitable financing models.

***Effective reporting module***

One of the critical modules of an AMS is its reporting module. This module should allow users to generate reports, charts and photographs; an assessment of the general condition of the building stock; a list of capital renewal activities by year, category and priority; deferred maintenance; and a projection of annual deferred maintenance based on expected annual funding. The reporting module should be able to exploit all data regarding asset inventory, condition and capital renewal costs.

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