Post Implementation Review – MAIN-LINK

January 21, 2008

THE CITY OF
Edmonton

The Office of the City Auditor conducted
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International Standards for the
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Summary for City Council

MAIN-LINK was a capital project undertaken by the City from 2002 to 2005 to implement a "linked" or common system using SAP software to track and manage the maintenance of City assets. The City's infrastructure assets, which have a replacement value of over $20 billion, include roads, sewer lines, light rail transit, buildings, vehicles, equipment, parks, information technology and more. The City's "linked" maintenance management solution provides a common system for planning, scheduling and managing the required tasks, recording and reporting the maintenance activities, and providing a history of such activities for future decisions. There are in excess of 1,100 users of this system in eleven business areas across four City departments.

We conducted a post implementation review of the MAIN-LINK project. A post implementation review is a formal assessment of a completed program/project to ascertain its degree of success, determine if further improvements can be made and whether lessons learned can be applied to improve future programs/projects.

Council is the City's governing body and approves funding for capital projects such as MAIN-LINK. The City Manager is responsible for recommending initiatives and managing approved capital programs in an efficient, effective and economical manner. Funding for MAIN-LINK was approved by Council as a composite program within the context of the City's Enterprise Resource Planning (ERP) strategy. We were able to identify that expenditures amounting to $13.1 million were incurred to implement MAIN-LINK, which was initiated as the first ERP project.

Our objective was to assess whether MAIN-LINK's objectives were accomplished, and business processes and controls were implemented as planned. Our overall conclusion is that the MAIN-LINK project was partially successful in meeting its objectives. Further improvements are needed to achieve the planned benefits of this capital investment and be more responsive to business area needs. We have made five recommendations for Administration to achieve this and strengthen controls for future ERP projects.

A full report outlining the detailed results of our review is attached. The purpose of this summary is to highlight areas requiring improvement by Administration and any direction that Council may need to provide to Administration in order to fulfill its governance and oversight role.

Realization of MAIN-LINK Objectives
Our review indicated that although the City has implemented a common system for its diverse maintenance activities, business processes have not been reengineered to the extent of achieving a standardized maintenance management process and fully utilizing the capabilities of the system. Standard reports from MAIN-LINK are not fully meeting the operational needs of business areas. Further, the governance process and support

model for the system have not been fully developed to effectively respond to the needs of MAIN-LINK users. This has hindered the City's ability to achieve many of the business benefits perceived at the time the project was conceptualized and approved.

We have recommended that:
- A strategy for achieving continuous improvement and planned business benefits associated with MAIN-LINK be developed and implemented.
- Assistance, support and training be provided to all business areas in extracting and using meaningful reports from MAIN-LINK for better decision-making.

MAIN-LINK Controls
The general controls pertaining to availability, reliability, and data recovery of the system are operating as intended. However, two project specific controls that require attention in creating user acceptance of the system are provision of training and up to date documentation to users. An ongoing training strategy was not in place and users received minimal corporate support after the system was implemented.

We have recommended that the training and documentation needs of all business areas be reviewed and that they be provided with the required support to enable them to take advantage of the new tools and technology and use the system as intended.

Cost/Benefit Analysis
Our objective was to establish whether the MAIN-LINK project's cost/benefit targets were achieved, and variances if any, were justified and approved. In ideal circumstances, the Administration would establish formal cost/benefit targets prior to funding approval, track costs as they are incurred, collect data on benefits at they are achieved and report on their achievements. The OCA would in turn review the reported costs and benefits as part of a post implementation review.

In the MAIN-LINK project's case, no cost/benefit targets were formally established at the start of the project. The key driver for initiating this project was the replacement of obsolete legacy systems. Executive Committee asked for a cost/benefit analysis on the ERP program as part of the 2004 budget cycle. The Administration provided some information to Council on costs, benefits and a pay-back analysis, but this information was not updated. Once the project ended, there was no governance model in place to require formal reporting on whether cost and benefit targets had been achieved, and if not, how they would be achieved and reported. Since formal targets were not established and there was no consistent mechanism of tracking and reporting on the final outcomes of the project, the City cannot demonstrate whether MAIN-LINK's cost/benefit targets were achieved or not.

In our opinion, a major capital project such as MAIN-LINK required more rigor in establishing cost targets and defining how costs were to be captured and reported. In order to provide consistent reporting, it is also essential that all costs of ERP projects are reconciled to the City's Corporate Financial System (SAP) and all sources of funding are identified.

Actual savings from the elimination of legacy systems have not been determined and formally reported by the Administration. Benefit registers initiated during the project to record business benefits were not kept up to date. Further, until business areas receive the required direction and support to reengineer their processes and use the system as intended, the City cannot harvest many of the business benefits that were projected.

We have recommended that:
- The City's ERP Project Management methodology comply with Administrative Directive A1424A and set out basic expectations/standards on how costs will be captured and reported for ERP projects.
- Consistent reporting be undertaken on the outcomes of ERP projects in relation to the cost and benefit targets, and that the costs should be reconciled with the City's Corporate Financial System (SAP).

Other Considerations for Council
A combination of SAP and project documentation indicate an investment of $13.1 million on MAIN-LINK from 2002 to 2005. This does not include internal costs that were incurred through the use of City staff from all business areas on this project. The City's current practice is to budget for additional funds required to deliver a project and there is no requirement to formally report on the cost of internal resources used in delivering a project. In our opinion, this practice does not provide the City with the true cost of a capital project. Future costs may also be incurred to standardize and reengineer the system to a level that derives planned business benefits. If desired, Council may direct the City Manager to review the current practice and implement appropriate changes to facilitate a reasonable level of reporting on the true cost of ERP projects.

It should be noted that business areas use MAIN-LINK to serve their maintenance management needs and can no longer use the legacy systems that served them prior to MAIN-LINK. In our opinion, a concerted effort is required to achieve a return on investment. Council may direct the City Manager to give priority to harvesting the projected benefits from the City's investment in MAIN-LINK.

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Post Implementation Review - MAIN-LINK

1.   Introduction

The Office of the City Auditor's (OCA) 2007 work plan approved by City Council included a post implementation review of MAIN-LINK, the City's maintenance management technology solution. A post implementation review is a formal assessment of a completed program/project to ascertain its degree of success, determine if further improvements can be made and whether lessons learned can be applied to improve future programs/projects. The OCA's overall objective was to assess whether MAIN-LINK's objectives were accomplished, and business processes and controls were implemented as planned.

2.   Background

MAIN-LINK was a project that started in late 2000, when a cross-departmental task force gathered to design a standard maintenance process that could be applied across the City. At that time, the City's maintenance management needs were served through nine independent "legacy or best of breed" systems. Once an appropriate vendor was identified, the MAIN-LINK project was initiated to implement a "linked" or common system (on SAP software). It focused on standardizing processes for identifying, planning, executing and closing maintenance activities in eleven business areas across four City departments. The City's infrastructure assets, which have a replacement value of over $20 billion, include roads, sewer lines, light rail transit, buildings, vehicles, equipment, parks, information technology and more. All these assets that make vital contributions to our quality of life need to be maintained. The City's "linked" maintenance management solution provides a common system for planning, scheduling and managing the required tasks, recording and reporting the maintenance activities, and providing a history of such activities for future decisions.

Enterprise Resource Planning Strategy
MAIN-LINK was implemented within the context of the City's Enterprise Resource Planning (ERP) Strategy[1]. On April 5, 2001, the Senior Management Team (SMT) established an ERP Strategy for the City. The key to proceeding with the ERP approach was to leverage on the core information systems the City has in place. An ERP Program Office was established to assist SMT in developing an analytical framework and help in making decisions surrounding ERP and the systems that support it. SMT approved the following definition of ERP:

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[1] ERP is a business driven approach that addresses the delivery of services at an enterprise level rather than a business unit, branch, or departmental level. It also promotes the use of common business practices across the corporation.

A group of individual business software applications covering the functional areas of the City that are integrated to form a single 'enterprise wide' application based on common databases and data structures.

Six emerging ERP initiatives (Maintenance Management, Project Management, Asset Management, E-Procurement, Data Warehouse and Application Integration, and Real Estate and Property Management) were planned for implementation using SAP functionality. SMT also approved eight guiding principles (outlined in Appendix 2) that set the strategic direction for ERP.

MAIN-LINK Project
In 2002, MAIN-LINK was initiated by SMT as the first ERP project. In view of the City's diverse maintenance activities, SMT was aware that significant business process changes may be required to achieve a standardized solution. Therefore, all impacted business areas were involved in developing the functional specifications and a phased approach was undertaken to facilitate overall project acceptance.

The key driver for Phase 1 of MAIN-LINK was the replacement (due to obsolescence) of the legacy systems that supported maintenance activities of four business areas. Three other business areas were also included in the scope for Phase 1 because they did not have applications supporting their maintenance activities. The objective of Phase 1 of MAIN-LINK was to establish an integrated system and a common maintenance management process in the place of all the independent systems or processes used in the following business areas:

- Roadways Maintenance
- Drainage Services
- Parkland Services
- Transit – LRT
- Traffic Operations
- Information Technology
- Business Systems Support

The project team initiated an additional project (Phase 1A) to consider some of the issues that arose from Phase 1 implementation. MAIN-LINK was then extended to the following additional business areas as part of Phase 2:

- Gold Bar Wastewater Treatment Plant
- Land and Buildings
- Emergency Response
- Mobile Equipment Services

SAP's development methodology (Accelerated SAP) was used to implement Phase 1. Phase 2 adopted a more flexible approach, using independent consultants and the Deloitte Consulting development methodology.

The City's model for ERP technology solutions assigns responsibility for managing and maintaining the core applications including SAP, to the General Manager of Corporate Services. Two Branches within Corporate Services provide the required support. The Business Enterprise Services (BES) Branch provides services to users in value management, change management, business process analysis and project management. The Information Technology Branch provides management and technical support to the City's technology infrastructure (systems, hardware and networks). In keeping with the ERP strategy of a business driven approach, the Information Technology Branch, although part of the Steering Committee, was not directly responsible for managing the MAIN-LINK project. Business Systems Support (part of the Information Technology Branch effective November 6, 2007) maintains the core applications from a business perspective.

Project Structure
SMT, the Executive Sponsor of the ERP Program, appointed a Project Sponsor (General Manager of Asset Management & Public Works) for the MAIN-LINK project. A Steering Committee with representation from all impacted business areas as well as some corporate resources was formed to provide direction. The project team was comprised of the ERP Program Manager, a Project Manager, Functional Team Leads, and internal and external resources.

3.   OCA Objectives

Our objectives for this post-implementation review of the MAIN-LINK project were:

1. To assess whether the objectives of MAIN-LINK were realized in an efficient, effective and economical manner.
2. To determine whether planned business processes and controls were implemented, and are operating as intended.
3. To establish whether cost/benefit targets were achieved, and variances if any, were justified and approved.

4.   Methodology and Scope

We used applicable guidelines from the Information Systems Audit and Control Association's (ISACA) Standard for Post Implementation Reviews in this project. The purpose of this international standard is to ensure consistency in carrying out post implementation reviews of information technology solutions.

All phases of the MAIN-LINK project were considered to be in scope for the purpose of this post implementation review. Two Primary Contacts (the Manager of BES and the Manager of Energy, Environment and Natural Areas) were appointed by the General Managers of Corporate Services and Asset Management and Public Works to assist us with this corporate review.

We reviewed project documentation and other relevant documentation to familiarize ourselves with the MAIN-LINK project. Our objective was to minimize duplication with

work completed by the MAIN-LINK project teams, consultants, and OCA staff in other projects. We developed a standard questionnaire in collaboration with the Primary Contacts and facilitated assessments by key staff in the eleven business areas that implemented MAIN-LINK. The results of these assessments were then validated against corporate goals, direction and requirements to develop recommendations. We also reviewed project and corporate documentation supporting the costs and benefits of the MAIN-LINK project, validated and analyzed the information, and attempted to reach a conclusion on whether cost/benefit targets were achieved.

The eight ERP guiding principles approved by SMT and the five specific objectives developed by the MAIN-LINK project team formed the basis of our review as agreed to by all stakeholders at the start of our review. The following were the five project specific objectives:

1. Design and construction of a unified standardized Maintenance Management Solution.

2. Development and Utilization of a City of Edmonton ERP Project Management Methodology, processes, tools, techniques and associated expertise to enable successful implementation of the Maintenance Management solution and future ERP projects.

3. The Maintenance Management solution will deliver the Key Performance Indicators and Performance Indicators defined by the 9 Business areas[2].

4. Create project acceptance in the stakeholder group through effective project communication and change management. Develop Organizational Change Management (OCM) tools, techniques and expertise to be used on other ERP projects.

5. Identification of short and long-term business opportunities in the 9 Business areas through the implementation of the Maintenance Management solution and a recommendation of Quick Wins.

5.   Summary of Results

5.1.   Realization of MAIN-LINK Objectives

Our objective was to assess whether the objectives of MAIN-LINK were realized in an efficient, effective and economical manner. A maintenance management technology solution has been developed for the City in place of the independent legacy systems and processes used by eleven business areas. It promotes an enterprise perspective for maintenance activities, positions the City to manage its assets as one corporate entity and provides a foundation for maintenance management to be integrated with other ERP systems. However, the business processes have not yet been fully

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[2] MAIN-LINK was implemented in two additional business areas thus bringing the total to eleven business area

reengineered to the level of achieving a standardized maintenance management process and the best use of the available functionality. We have recommended that the City Manager develop and implement a strategy for achieving continuous improvement and planned benefits associated with MAIN-LINK.

Our assessment of MAIN-LINK's level of achievement towards the ERP guiding principles is outlined in Appendix 2. The following is our assessment pertaining to MAIN-LINK's achievement of its five project specific objectives:

The design and construction of a maintenance management solution in all phases of the MAIN-LINK project was undertaken from 2002 to 2005. The following are some factors that contributed to MAIN-LINK's implementation:

- There was demonstrated support from SMT to achieve a standardized maintenance management solution. They appointed a Project Sponsor at the General Manager level to provide direction to the project and keep SMT informed of the progress on this project.
- A corporate steering committee was formed, chaired by the Project Sponsor, and with representation from all the affected business areas.
- The project was managed under a corporate funding strategy to allow business areas to focus on achievement of project deliverables.
- An ERP project management methodology was developed and used to provide rigor and focus for the project.
- Proven development methodologies and a mix of internal and external resources were used to position the project for achieving success.

Challenges
Standardization of diverse maintenance management processes comes with its own challenges. The City had nine legacy systems, some dating back to the early 1980's, and each was custom designed to meet the specific needs of a business area. One challenge identified by the ERP Program Office in 2001 was *the competing interests between the corporation and line business areas and the development of a common approach required to achieve the desired results.* Adjusting to a standardized enterprise solution required giving up some existing functionality, changing business processes to fit the new solution, and learning a new tool. This had an impact on staff in the affected business areas as well as their customers.

The project documentation we reviewed and results of the business area assessments we facilitated reflect these challenges. The project team was also faced with other problems resulting from the complexity of final solutions, availability of business area resources and the impact of chosen solutions on other support areas such as Finance and Materials Management.

Standardization and Reengineering

The implementation of the SAP module was based on the assumption that business areas would reengineer their processes and use a standardized system to plan their maintenance activities. In view of challenges faced in achieving consensus on design standardization and the effort required to change the diverse business processes, a decision was made to configure the system to incorporate most business processes as they functioned at the time and allow for standardization as and when business processes were changed. This decision required a governance process and support model that promoted continuous improvement and business areas reengineering their processes.

Support Model

The City established a Standard Maintenance Management Processing committee comprised of business area representatives to deal with issues arising from the Phase 1 MAIN-LINK implementation and ongoing enhancements required to the system and business processes. This committee was to manage the realization of planned benefits, the evolution of the maintenance processes and the SAP functionality. However, after the overall MAIN-LINK project was implemented, it was disbanded to make way for an Application Working Committee that focuses on required application changes to all modules of SAP including maintenance management.

The responsibility for maintaining the system as well as achieving the longer term improvements was passed on to Business Systems Support which was part of BES at the time. However, the Business Systems Support model was not equipped to handle major enhancements to the system but rather to provide the day-to-day maintenance of the system. In view of this, some of the MAIN-LINK issues, although well identified and analyzed by the project team, remain unresolved. These issues were reiterated by key staff in the eleven business area assessments we facilitated during this post implementation review. Two branch audits we completed in 2007 indicate that the Mobile Equipment Services and the Land and Building Branches have identified issues that impact their operations, and are working with Business Systems Support staff to address them in accordance with corporate priorities.

The City has recognized that it has to move from a project to a program focus that incorporates a strategy for continuous improvement and for effectively sustaining its programs. This learning has been applied to current projects such as Project and Contract Management and 311, and steps are being taken to ensure that adequate support and assistance is provided to business areas after the projects have been implemented. Business Systems Support has recently changed its organizational structure and positioned itself to address both enhancements and maintenance tasks more effectively. However, this model has not been fully developed to effectively support the needs of MAIN-LINK users.

Based on these results, we believe that although a technology based solution for the City's diverse maintenance activities has been developed, the support model needs to be enhanced to address business area issues at an enterprise level and to ensure that the system is used to achieve the intended opportunities and benefits of standardization through continuous improvement. *(Recommendation 1)*

Impact on Business Areas

Since business processes were not reengineered to the extent of fully achieving a standardized maintenance management process and the best use of SAP functionality, most business areas have continued to use traditional methods to plan, schedule and prioritize their maintenance work. MAIN-LINK is largely being used as a receptacle to collect labour costs of the required maintenance work via time entry. The functionality that facilitates better planning of labour, material and services, and the scheduling of activities and tasks is not used to its full capability.

Our review indicates that although the functionality to manage by performance measures exists, both within MAIN-LINK and the City's Executive Information System, inadequate maintenance planning data within the system has not allowed all business areas to reap the benefits of managing by performance measures.

Other related issues with the current configuration and business processes, that are outlined in the project documentation and were reiterated in the business area assessments we facilitated, are the volume of notifications and maintenance orders and time entry. A review of these concerns needs to be incorporated in the continuous improvement strategy required for maintenance management. *(Recommendation 1)*

Communication Strategy

The City invested time and resources in preparing a communication strategy for internal and external groups. Communication with SMT and creating awareness of the MAIN-LINK project in the City was handled well. Some challenges with internal communication within the committee structure were faced and reflected in project documents and recommendations made to improve communication in future projects. An ongoing communication strategy was not prepared and implemented after go-live leaving communication between business areas very informal.

We believe that project acceptance in business areas that use MAIN-LINK can be improved further through ongoing communication and change management. An ongoing communication strategy and an appropriate forum need to be incorporated in the continuous improvement strategy required for maintenance management. *(Recommendation 1)*

Undelivered Corporate Functionality

Two other business area expectations, billing and loading operating budgets, which were included in some of the legacy systems were not met. Billing for maintenance activities performed for external organizations results in generation of revenue that

offsets the operating expenses in the City's budget cycle. An interim billing process was built to fill the gap with the understanding that adequate billing functionality would be developed later. This has not been achieved to date and business areas have developed a number of workarounds to meet their requirements. The MAIN-LINK project team did not address the business area expectation pertaining to loading operating budgets in anticipation that a corporate direction and solution would be implemented in the future. The billing and loading operating budget requirements of business areas need to be reviewed as part of the continuous improvement strategy and addressed through corporate solutions. *(Recommendation 1)*

Reporting

The Phase 1A Improvement Project team identified addressing management reporting deficiencies of the maintenance management solution as the next immediate improvement priority. Our review determined that standard reports from MAIN-LINK are not fully meeting the operational needs of business areas. Reporting was not implemented as planned and the responsibility for completion was transferred to Business Systems Support at the end of the MAIN-LINK project. The Business Systems Support staff has provided some reports to users depending on their priority and the limited resources available, but there are many pending requests from users. This has impacted the use of the system to facilitate performance monitoring, managing the maintenance of City assets and minimizing risk through timely planning and decision-making. The required information may be in the system, but users are not able to extract the information to fully achieve their objectives.

Based on these results, we believe that in order to promote the use of MAIN-LINK as planned, a higher priority should be given to providing the required assistance, support and related training to all business areas in extracting and using meaningful reports from MAIN-LINK. *(Recommendation 2)*

5.2.   MAIN-LINK Controls

Our objective was to determine whether controls were implemented and are operating as intended. The Plant Maintenance module of SAP was implemented in the City's existing SAP and general controls environment. Our Office has had an opportunity to evaluate the general controls around SAP implementation in a number of other projects. Therefore, our review was restricted to discussions with the Information Technology and BES staff and getting feedback from business areas on whether controls were operating as intended. In general, there were no major issues with the availability, reliability, and data recovery of the system. The SAP functionality provides adequate management trails and drill down functionality to fulfill user needs. Access to the system is managed by Business Systems Support staff based on user roles and responsibilities and supervisory approval.

While the general controls are operating as intended, two project specific controls that require attention in creating project acceptance are provision of training and up to date documentation to users. Addressing these two controls will enable MAIN-LINK users to take advantage of the new tools and technology and use the system as intended.

Training and Documentation
The City invested significant time and resources in training MAIN-LINK users through a combination of approaches such as "just-in-time-training", "train-the-trainer", etc. Feedback from users outlined in project documentation as well as feedback received at the business area assessments we facilitated indicates that some challenges were faced with the timing of the training and the stability of the system during the training phase. As a result, users found training and documentation to be too generic and some were left without a clear understanding of what they needed to know to conduct their specific work. Also an ongoing training strategy was not in place and users received minimal corporate support after the system went live. Some business processes have changed since MAIN-LINK was implemented, and some employees that were trained are no longer with the business areas. In the absence of up to date documentation, new staff have had to rely on existing staff to walk them through the system or have developed their own workarounds to obtain the information they need.

The City's 2007 to 2009 SAP Strategy provides a funding strategy for ongoing SAP training. The City is in the process of hiring external expertise for an SAP Application Training Strategy which will include the development of training materials, the delivery of end user courses and supplying resources for ongoing services related to the project. The City is planning to address the training and documentation needs of MAIN-LINK users within the context of the overall SAP Application Training Strategy.

> Based on our review, we believe that the general controls pertaining to the availability, reliability, and data recovery of MAIN-LINK are operating as intended. However, two project specific controls pertaining to the training and documentation needs of MAIN-LINK users need to be addressed to enable them to take advantage of the new tools and technology and use the system as intended. *(Recommendation 3)*

5.3.   Cost/Benefit Analysis

Our objective was to establish whether the cost/benefit targets of MAIN-LINK were achieved, and variances if any, were justified and approved. Since formal targets were not established at the start of the project, and there was no consistent mechanism of tracking and reporting on the final outcomes of the project, the City cannot demonstrate whether MAIN-LINK's cost/benefit targets were achieved or not.

In the timeframe that MAIN-LINK was implemented (2002 to 2005), the Administration did not have a formal framework such as value management, that now requires projects such as MAIN-LINK to be justified based on their cost and benefit targets. In addition, the City did not have the expertise and experience of predicting the complexity of ERP

technology solutions and the time and effort required for such an initiative. A composite ERP capital budget fund was established based on a limited cost/benefit analysis undertaken with the assistance of SAP consultants to initiate Phase 1 of MAIN-LINK. As the project progressed and more information was available, Corporate Services used the City's budget adjustment and Capital Budget funding processes to obtain additional funding.

MAIN-LINK Costs
In 2001, a four-year plan was approved by SMT to implement six ERP systems including MAIN-LINK at a projected capital cost of $14.1 million, including additional SAP licences. The MAIN-LINK project was the first to be implemented and its key driver was the replacement of maintenance management legacy systems due to obsolescence.

Since a formal cost/benefit analysis was not undertaken at the start of the project, we could not establish a formal cost target for MAIN-LINK. The actual costs for each phase were captured and reported based on the available sources of funding, and they were not reconciled to the City's Corporate Financial System (SAP). Therefore, other than the capital costs charged to the composite ERP program, we were unable to confirm the accuracy and completeness of the overall cost of the MAIN-LINK project.

Corporate Services prepared a report that provided a summary of the expected costs of the overall MAIN-LINK project in response to the following request from City Council:

At the July 15, 2003 City Council meeting, the following motion was passed:

> *That Administration report to the October 1, 2003 Executive Committee meeting on the components of Project N0.XX-18-0200 – Enterprise Resource Planning which Administration will be recommending be funded in 2004.*

In the Administration's response to this request[3] a pay-back analysis for the overall MAIN-LINK project was prepared with the assistance of an external Value Management consultant. The cost and benefit targets however were based on an interim report and these targets were not updated as the project progressed and new information became available.

We attempted to determine the actual cost of the overall MAIN-LINK project by using the following approach:

- Tracing the costs that were charged to the composite ERP Capital Budget program on the City's Corporate Financial System (SAP) and obtaining confirmation from the Finance Branch

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[3] Corporate Services Department, 2003COS007: 2004 Recommended Components for Enterprise Resource Planning Program

- Reviewing project documentation and determining if there were additional costs incurred but charged to other programs
- Determining what should constitute the true cost of the project to the City.

Table 1 below outlines the cost target established in response to the July 15, 2003 City Council motion, the actual costs that were charged to the ERP Capital Budget program, and additional costs incurred that are reflected in project documentation. We were unable to trace these additional costs in the City's Corporate Financial System since they were funded from sources other than the ERP Capital Budget program. These sources were not clearly identified to allow us to confirm the accuracy and completeness of the additional costs.

Table 1: MAIN-LINK's Overall Costs ($ Millions)

Cost Target – 2003	Actual Capital Costs	Additional Costs *	Overall Costs
$11.2	$11.1	$2.0	$13.1

* Reflected in project documentation

Our review indicated that it cost the City $13.1 million to achieve a technology solution for maintenance management from 2002 to 2005. This does not include internal costs that were incurred through the use of City staff from all business areas on this project. The City's current practice is to budget for additional funds required to deliver a project and there is no requirement to formally report on the cost of internal resources used in delivering a project. It also does not include the additional costs that may be incurred to standardize and reengineer the system to a level that derives the business benefits that were planned.

In the opinion of the OCA, a major capital project such as MAIN-LINK required more rigor in establishing cost targets and defining how costs were to be captured and reported. This requirement is outlined in Section 2.02[4] of Administrative Directive A1424A, *Project Management for Projects.* The City has an ERP Project Management methodology but it does not address how costs will be captured and reported.

We believe that it is important to set out basic expectations/standards on how costs will be captured and reported for all ERP projects. In order to provide consistent reporting, it is also essential that all costs of ERP projects are reconciled to the City's Corporate Financial System and all sources of funding are identified. These requirements need to be incorporated in the City's ERP Project Management methodology to comply with Administrative Directive A1424A and provide consistent reporting of the outcomes of ERP projects. *(Recommendations 4 and 5)*

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[4] General Managers shall develop a project management framework and procedures to set out basic expectations/standards encompassing the project management responsibilities and functions of scope, quality, time, cost, risk, human resources, contract/procurement, and information/communications.

MAIN-LINK Benefits

We attempted to confirm the benefits derived from the MAIN-LINK project by using the following approach:

- Reviewing project documentation and Administration's response to Council's motion of July 15, 2003 to establish the benefit targets
- Determining whether Administration had a formal way of reporting in relation to the benefit targets
- In the absence of such formal reports, we attempted to establish whether the benefit targets for the overall MAIN-LINK project were achieved based on the information that was available.

Our review indicated that no formal benefit targets were established for the project. The results of a pay-back analysis reported in response to Council's motion were based on the elimination of legacy systems. The interim report prepared by the Value Management consultant was not updated and no mechanism was established to track the actual savings. We confirmed that seven of the nine legacy systems have been decommissioned and the remaining two are scheduled to be retired in May 2008. However, additional work would be required by the Administration to determine whether the projected annual savings from the elimination of legacy systems were realized.

Business Benefits

The October 1, 2003 report to Executive Committee stated that:

> *The initial intent of the MAIN-LINK Project was to focus on providing the foundation for business benefits. By completing Phase 2, all plant maintenance management will be performed in a common system. Now the focus can turn to the formation of a corporate wide perspective on business benefits. A process of business benefits identification and tracking is now being introduced.*

A number of non-quantifiable business benefits were identified and reported in Administration's October 1, 2003 report to Executive Committee. These include having a single system to plan, budget, control and report maintenance costs; more accurate reporting in an integrated system; improving overall customer service, especially response times; as well as common employee training and development across the corporation, assisting with employee transferability between business areas. Although SAP has delivered the functionality to position the City to harvest these benefits, most of them have not been achieved as yet. The planned benefits can only be achieved when business areas receive the required support to reengineer and standardize their processes, and use the delivered functionality as intended. The benefit registers initiated by the Value Management consultant for identifying and tracking business benefits were not kept up to date and no support was provided to business areas to achieve this.

The project documentation indicated that another target envisaged for the MAIN-LINK project was a 10% return of investment and other intangible benefits (ROI). However, no further decisions were made as to how ROI will be measured. The City has since developed internal expertise for providing support in value and change management and BES staff now provides support to departments, as required, in establishing and maintaining their benefit registers. The Project and Contract Management system will also provide better tools to manage and track project costs and deliverables and is also geared to provide better reporting of capital projects. In the case of MAIN-LINK however, once the project ended, there was no governance model in place to require formal reporting on whether cost and benefit targets had been achieved, and if not, how they would be achieved and reported.

In view of the difficulties associated with confirming the actual costs and benefits relating to the MAIN-LINK project and the delay in realizing planned benefits, we are unable to confirm or calculate the associated return on investment, and cannot determine whether the project's deliverable of 10% return on investment has been achieved.

In the opinion of the OCA, the City Manager needs to establish and implement a strategy for achieving the planned business benefits associated with implementing MAIN-LINK. *(Recommendation 1)*

It is also essential that there is consistent reporting of the outcomes of ERP projects in relation to the cost and benefit targets. *(Recommendation 5)*

MAIN-LINK Funding
After Phase 1 was completed, SMT, the Executive Sponsor of the ERP program, approved an extension of the MAIN-LINK project within the context of a composite ERP program. Phase 2 of MAIN-LINK was initiated to replace the maintenance applications supporting Building Maintenance and Mobile Equipment Services, as well as to provide an automated maintenance application for Gold Bar Wastewater Treatment Plant. To achieve this, the timeline for implementing MAIN-LINK was extended from March 2003 to November 2004. Two corporate processes were used to reflect the change in direction:

- The City's budget adjustment and Capital Budget processes were used to direct the ERP capital funding to incorporate Phase 2 of the MAIN-LINK project.
- The decision to pursue Phase 2 of MAIN-LINK in place of other ERP systems envisaged by SMT in 2001 was conveyed to City Council by Administration through capital budget submissions and updates during the budget cycle.

The City's Corporate Financial System (SAP) records, as confirmed by the Finance Branch, show an ERP budget of $12.0 million from 2002 to 2005. In total, actual capital costs of $11.1 million were charged to the ERP program budget with a positive variance of $.9 million.

However, if the project's September 2003 cost target of $11.2 million and the overall costs of $13.1 million are taken into account, there was a negative variance of $1.9 million.

> In the opinion of the OCA, this contrast shows why it is important to set out the expectations of a project and report the outcomes in a manner that facilitates determining the success of a project. *(Recommendations 4 and 5)*

6.   Conclusion and Recommendations

Our objectives in this post-implementation review were to assess whether MAIN-LINK's objectives were realized; planned business processes and controls are operating as intended; and cost/benefit targets were achieved.

The initial intent of MAIN-LINK was to replace obsolete legacy systems and provide a foundation for business benefits. A technology-based maintenance management solution has been implemented in place of the independent legacy systems. The City is positioned to manage its maintenance activities as one corporate entity and this also provides a foundation for maintenance management to be integrated with other ERP systems.

Most business processes however have not been reengineered and standardized to the level that would achieve the perceived business benefits. Business areas need more assistance, support and related training in extracting and using meaningful reports from MAIN-LINK for better decision making. Some of the strategic objectives (outlined in the ERP guiding principles) such as process improvements, management of assets through a consolidated corporate view, productivity improvements, and the ability to manage by performance measures have yet to be achieved. Since the MAIN-LINK project has been completed, and business area resources are not available fulltime within a project structure, the City Manager needs a strategy for achieving continuous improvement and planned business benefits as well as for addressing outstanding issues.

The general controls pertaining to the availability, reliability, and data recovery of the system are operating as intended. However, project specific controls such as the training and documentation needs of business areas have to be addressed to improve their staff's ability to perform their jobs in an efficient, effective and economical manner.

In the absence of a consistent mechanism of tracking and reporting on the final outcomes of the project, the City cannot demonstrate whether MAIN-LINK's cost/benefit targets were achieved or not. The City's ERP Project Management methodology needs to comply with Administrative Directive A1424A by setting out basic expectations/standards on how costs will be captured and reported for ERP projects. There is also a need for consistent reporting of the outcomes of ERP projects in relation to the cost and benefit targets, and the costs need to be reconciled with the City's Corporate Financial Information System.

The OCA believes that implementation of the following recommendations will strengthen the ERP project controls and assist in realizing the planned business benefits associated with the City's investment in MAIN-LINK. Responses received from the Administration to each recommendation have been incorporated below. Further comments received from the Administration are attached as Appendix 1.

Recommendation

1. That the City Manager develop and implement a strategy for achieving continuous improvement and planned business benefits associated with MAIN-LINK. This would include assessing the maintenance management models of business areas, implementing required standardization and business process changes, providing a forum for ongoing communication and ensuring that outstanding issues are resolved to the satisfaction of business areas.

Management Response and Action Plan

A working committee was in place during 2005 and 2006 to address improvement areas in MainLink. While some improvements were made, resource constraints limited the extent of enhancements that could be undertaken.

A team of business users and process staff will be established in Quarter 1 2008 for the purpose of undertaking the continuous improvement of the maintenance management business processes and achieving improvements to the both the business processes and functionality of the application.

Responsible Party: General Manager Corporate Services

Recommendation

2. That the General Manager of Corporate Services provide assistance, support and related training to all business areas in extracting and using meaningful reports from MAIN-LINK for better decision making (operating, management, risk minimization, performance measures, benchmarking, etc.).

Management Response and Action Plan

Since the go-live of MainLink in 2003, there have has been significant ongoing support and work by the Business Support Office and IT Branch with the business users to improve reporting, address issues and improve the use of Main-Link by the businesses. Further, in February 2007, the IT Branch in consultation with the Business Support Office and end users developed a 3 year plan for SAP development and enrichment which identified resources, funding and prioritization of enhancement work, including the maintenance area.

Enhancements to SAP standard reporting and associated end user support are

scheduled for Quarter 2, 2008.

In addition, a new training coordination function has been established in the Business Support Office with a mandate to improve end user training and adoption of ERP systems (including SAP). This function is expected to be fully functional in the first quarter of 2008.

Responsible Party: Information Technology Branch/Business Support Office

Recommendation

3.   That the General Manager of Corporate Services review the training and documentation needs of all business areas and provide the required support to enable MAIN-LINK users to take advantage of the new tools and technology and use the system as intended.

Management Response and Action Plan

Training and documentation needs were identified as ongoing issues that needed support from the go-live period. Efforts were made to provide training assistance through business super users, but this approach has become ineffective given staff turnover.

 A new training coordination function has been established in the Business Support Office with a mandate to improve end user training and adoption of ERP systems (including SAP). This function is expected to be fully functional in the first quarter of 2008.

Responsible Party: Information Technology Branch/Business Support Office

Recommendation

4.   That the General Manager of Corporate Services ensure that the City's ERP Project Management methodology complies with Administrative Directive A1424A and sets out basic expectations/standards on how costs will be captured and reported for ERP projects.

Management Response and Action Plan

A review of project structures for major projects was undertaken in late 2006. All corporate system projects since that review follow the standards established in the Administrative Directive A1424A.

Responsible Party: General Manager of Corporate Services

Recommendation

5. That the General Manager of Corporate Services ensure that there is consistent reporting of the outcomes of ERP projects in relation to the cost and benefit targets, and that the costs are reconciled with the City's Corporate Financial System.

Management Response and Action Plan

Value Management is used by Administration to develop and report all ERP projects cost and benefit targets. At the start of an ERP project, a Value Case, containing estimated cost and estimated tangible and intangible benefits, will be developed by the Project Manager and stakeholders. The Project Manager will update the Value Case throughout the project to ensure that it reflects accurate cost and benefit estimates. The value case contains a Benefit Plan that assigns responsibility for achieving benefits to the appropriate business area. Once an ERP project is implemented, business owners identified in the Benefit Plan will report results and these will be included in the semi-annual Value Report. The Value Report summarizes results of project benefit plans and compares actual benefits realized to estimated benefits. ERP project results will be reported for a minimum of 5 years.

All ERP projects will record their costs in the Project Systems module from the PacMan Project. All relevant project documents will be stored in SAP Document Management. This includes cost reconciliation documents.

Responsible Party: Business Enterprise Services Branch

The OCA thanks the Primary Contacts, the management and staff of Corporate Services, and the business area staff that assisted us with this project for their cooperation and support.

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Appendix 1

Further comments received from the Administration

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Further comments received from the Administration

MainLink – Management Perspective

History
- The key driver for MainLink was the required replacement (due to obsolescence) of the HP 3000 and HP 9000 mainframes that supported maintenance activities for Roadways Maintenance, Drainage Services, Parkland Services, and Transit – LRT. Three other business areas were also included because they did not have applications supporting their maintenance activities.
- MainLink was not undertaken with an explicit cost saving target. It was anticipated there would be cost avoidance savings because there would be no need to develop and support several new stand alone maintenance management applications and replace the MESIS system for MES.
- Phase I of MainLink saw seven of the ten business areas go-live on March 24, 2003:
    – Roadways Maintenance
    – Traffic Operations
    – Transit – LRT
    – Drainage Services
    – Parkland Services
    – Information Technology
    – Business Systems Support.
- Phase II involved:
    – Gold Bar Wastewater Treatment Plant – end of 2003
    – Building Maintenance – end of 2003
    – Mobile Equipment Services – end of 2004.
- The initial intent of the MainLink Project was to focus on providing the foundation for business benefits, recognizing the benefits would take time to achieve because of the extent of business process change required.

Every Day Use of MainLink
- MainLink is used successfully every day by the maintenance business units across the City.
- Key statistics on its use from go-live in 2003 to January 11, 2008 include :
    – Over 647,000 orders generated, tracking 7.5 m staff hours on maintenance activities.
    – Cost tracking for $621.7 m expenditures on labour, equipment, material, contracts and external revenue for maintenance activities.
- Currently, there are 1,777 users of MainLink for maintenance management, including the associated time entry and billing activities.

MainLink is Integral Part of ERP and the City's Asset Management Life Cycle Program

- MainLink, as a project, was the first component of the Enterprise Resource Planning (ERP) strategy started in 2001.

- MainLink needs to be seen as one part of the ongoing program for the management of City assets over their lifecycle. MainLink deals with the maintenance of assets. The Project Management/Contract Management project deals with the planning, budgeting and project management for the delivery of new or upgraded assets. The Tangible Capital Assets project provides the recording and amortization of assets in compliance with public accounting standards. When these projects are completed, the City will have a common system, using SAP, to assist in managing its assets.

MainLink Improvements Supported by the SAP Strategy

- The SAP Strategy, developed by IT Branch in consultation with the Business Support Office and business users was approved by SMT in March 2007. The Strategy identified several features to address business issues arising from the implementation of MainLink.

- The SAP Strategy identified the need and resources for improvements to reporting activities for maintenance management. Reporting has been recognized as a significant issue for the business users since the Phase 1. The SAP Strategy has two initiatives for reporting:
    - Enhancements to SAP standard reporting and the required end user support are scheduled for Quarter 2, 2008.
    - The implementation of the Business Intelligence module, scheduled for 2008 as part of Phase 2 of the Project Management/Contract Management project, will allow for improved reporting for maintenance activities.

- The SAP Strategy included a training program for the ongoing and sustained training for all SAP modules, including maintenance management. The Strategy provided for ongoing funding. As well, the Business Support Office has established a training co-ordination function

Opportunities for Improvement Balanced with Resource Constraints

- Administration concurs with the City Auditor that MainLink works as a technology based solution and that it provides the functionality to manage assets on a corporate basis.

- There are recognized, ongoing areas needing improvement include reporting, training, documentation, the use of maintenance plans and the use of cost/benefit analysis. Administration has been working to address these issues since the Phase 1 go-live.

- The pace of enhancements on reporting has not been adequate for some business units. Support for training has required the development and funding of a new model since the previous training model had limited success. Resources for training were limited given the demands to support existing users and the substantial increase in users since 2003.

- Significant enhancements to identify value, including benefits and costs, use value management.

- Administration has a strategy and is undertaking the support and enhancement work to achieve both the business needs of the MainLink users and the corporate needs for asset management life cycle subject to resources.

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Appendix 2

ERP Guiding Principles

ERP Guiding Principles

SMT's vision for a standardized maintenance management process was based on the principle that success is dependent on the City's ability to link long-term strategic objectives with short-term actions. It involved achieving consensus on a vision of a common business approach for maintenance management that all business areas could operate within and in collaboration with other ERP projects in the long run. The achievement of the eight ERP guiding principles was therefore assessed on the basis of MAIN-LINK's level of achievement towards the long-term strategic goals. Based on information collected during this post implementation review and input from the Primary Contacts, the following is our assessment of MAIN-LINK's level of achievement in relation to the eight guiding principles:

Guiding Principles	MAIN-LINK's Level of Achievement
1. Renew maintenance management. "This is not about reinventing the old". • Process Improvements (challenge and adopt the best) • Take advantage of the new tools and capabilities • Productivity Improvement	A technology-based solution for maintenance management has been implemented. The City now needs to focus on reengineering business processes to achieve the planned business benefits and productivity improvements. Business areas also need ongoing support to take advantage of the new tools and capabilities.
2. Improve the management of assets through a consolidated corporate view (existing, changes, growth, condition and service level).	The functionality to provide a consolidated corporate view has been implemented. The City is in the process of improving its ability to make decisions based on an asset life cycle perspective by implementing other ERP projects such as Project and Contract Management and Tangible Capital Assets.
3. Improve staff's ability to perform their jobs.	Staff received generic training and documentation during implementation. Their specific training, documentation and reporting needs have to be assessed and ongoing support provided to improve the ability to perform their jobs.

Guiding Principles	MAIN-LINK's Level of Achievement
4. Minimize risk through timely planning and decision-making.	Some business areas are using MAIN-LINK to minimize risks in some aspects of their maintenance processes. Other business areas need to use the system to plan and schedule maintenance orders as was foreseen when the functional specifications were prepared.
5. Realize benefits from advancing the ERP Strategy of standardization, single data capture at source, integration, sustainability, and rationalized environment.	MAIN-LINK provided the foundation for achieving standardization and advancing the ERP strategy. Implementation of uniform practices and other ERP systems will result in achieving future benefits of standardization and rationalized environment.
6. Gain competency in the corporation to become self sufficient in advancing the ERP strategy.	Since new functionality is being added on an ongoing basis, the City has chosen to use a mix of internal and external resources. Projects are managed by internal staff and steps are taken to ensure that knowledge transfer occurs.
7. Advance the ability to manage by performance measures.	The system provides the ability to manage by performance measures. The City has to make a concerted effort to reengineer its maintenance management business processes and effectively use MAIN-LINK for managing by performance measures.
8. Support managing the City as a corporate entity.	The system provides a corporate view of maintenance activities and resources. A champion and an appropriate forum could encourage integration and use of the system to allocate and share maintenance resources at an enterprise level.

Conclusion
Based on the above assessment, we believe that a maintenance management technology solution has been implemented to replace the City's diverse legacy systems and provide a foundation for business benefits. The City now needs to focus on the achievement of its long-term goals and achieve the planned business benefits by using the system in an effective, efficient and economical manner.