

# **Workshop Proceedings**

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## **You Paid What??! Workshop on Full Cost Accounting Methodology for IT in the Public Sector**

**9-11 March 2004  
Ottawa Congress Centre**

**Workshop Organizer**

**Dustin Rivers  
Verney Conference Management  
[drivers@verney.ca](mailto:drivers@verney.ca)**

**Content Advisor and Rapporteur**

**Joseph Potvin  
IT Services Branch, PWGSC  
Government of Canada  
[joseph.potvin@pwgsc.gc.ca](mailto:joseph.potvin@pwgsc.gc.ca)**

**Chair**

**Michael Tinkler  
Board Member, Society of Management Accountants of Canada  
[tinkler@synerma.com](mailto:tinkler@synerma.com)**

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[joseph.potvin@pwgsc.gc.ca](mailto:joseph.potvin@pwgsc.gc.ca).



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## 1. What Is the Scope of Full Cost Accounting for IT?

"Full Cost Accounting" (FCA) is an advanced accrual accounting methodology that extends assessment and reporting beyond obvious cash outlays for direct deliverables, to a set of logically related downstream or indirect financial costs and benefits. This approach includes overhead and capital costs, as well as any significant enabling of cost avoidance and cost sharing opportunities.

Instead of informing decisions on the basis of single-project cash-flow, FCA also provides a framework to assess value-for-money from an enterprise perspective, and when appropriate, in consideration of the wider community.

FCA offers a structured way for executives, managers and other stakeholders to communicate about enterprise-level Return On Investment (ROI), as well as about positive or negative "externalities". It expands on conventional accounting methods through several key concepts:

- Accounting for costs rather than outlays
- Accounting for hidden costs
- Accounting for overhead and indirect costs
- Accounting for past and future outlays
- Accounting for costs according to activities or paths

In 2004, FCA methodology in the field of information technology (IT) is still in its formative stages, and the concept remains unfamiliar to most IT professionals. But the multi-billion dollar scale and aggressive momentum of information technology maintenance costs have led to worldwide demand for greater accountability in IT decision-making, recovery of financial control over IT, and more realistic appraisal of the returns on IT investments. Full cost accounting methodology is attracting interest in the Government of Canada as one way to improve integration of financial considerations into IT decision-making.

Collaboration in the workshop of operations-level financial analysts and IT decision-makers is driven by the broader effort to support implementation of Treasury Board's Cost Management Framework (CMF) through more effective controls on spending in relation to a major public sector cost centre: information technology. Government of Canada currently spends approximately \$7 billion each year on information technology solutions and services of all types, \$2.5 billion of which is for custom software production. This includes software writing, customizing and/or maintaining of architecture and code by personnel across all federal departments and agencies, as well as software production by contractors. In addition, the Federal Government spends \$500 million each year on royalty-based software licenses.

FCA helps managers to make more informed and prudent decisions about their programs, because they better understand and track their full costs. [http://www.ibm.com/services/bcs/files/CFO\\_FT.pdf](http://www.ibm.com/services/bcs/files/CFO_FT.pdf) When FCA is applied to competitive cost-per-point procurement processes, it presents a more competitive environment for a wider range of suppliers, compared with contract-by-contract criteria.

## 2. Workshop Presentations

This workshop focused on improving the measurement and management of IT decisions. The event was targeted to senior information technology managers, architects and procurement officer who guide the informatics direction of their organizations, as well as at accountants and financial analysts responsible for preparing departmental estimates, budgets and business cases for information technology projects and renewal.

### Opening Address:

**Michael Tinkler** is both a Certified Management Accountant and a Chartered Accountant. He serves on the Board of Directors of the Society of Management Accountants of Canada (CMA), and is President of Synerma Inc.

Mr. Tinkler introduced the CMA as representing 35,000 management accountants in Canada, and one of the leaders in management accounting research and standards development internationally, in part through its association with the International Federation of Accountants. He noted that the CMA is currently developing a guideline on "Evaluating Performance in Information Technology" in collaboration with the American Institute of Certified Public Accountants. An initiative on FCA for IT, said Tinkler, is a welcome contribution to this ongoing work, as it helps to provide a better basis for accountability through IT cost visibility, which enables better control.

Tinkler noted that FCA is probably what Treasury Board Secretariat already describes in its "Guide to the Costing of Outputs" (1989, Updated in 1994). [Http://www.tbs-sct.gc.ca/pubs\\_pol/dcgpubs/tbm\\_133/guide\\_e.asp](http://www.tbs-sct.gc.ca/pubs_pol/dcgpubs/tbm_133/guide_e.asp) The principal author of that guide, former Deputy Comptroller General, James McCrindell, participated in the present workshop, and during discussions, confirmed Tinkler's suggestion. Further detail, McCrindell said, is now provided in the CICA publication which he also authored, called "Costing Government Services for Improved Performance Measurement & Accountability" [http://www.cica.ca/index.cfm/ci\\_id/992/la\\_id/1.htm](http://www.cica.ca/index.cfm/ci_id/992/la_id/1.htm) This work provides practical guidance to all levels of government - federal, provincial, territorial and local - in developing complete and relevant cost information for their services, and in understanding the use of this information in improving performance measurement and accountability.

During discussions, participants asked for some clarification of the CMA and CICA mandates. Generally, the Society of Management Accountants of Canada (CMA) establishes standards and guidelines for internal management as well as social and economic reporting. The Canadian Institute of Chartered Accountants (CICA) sets standards and guidelines for external reporting, for example towards shareholders and citizens. There is considerable overlap between two, and recently the CMA and CICA have been discussing a merger. A third consortium, the Certified General Accountants Association of Canada (CGA), also sets professional standards for auditors and accountants.

## **Keynote Address:**

### **Expected Operational Impacts of Engaging “Full Cost Accounting” Methods for Information Management & Technology Decision-Making in the New Canadian IM/IT Services Agency**

**Michael Turner** is Assistant Deputy Minister for the Information Technology Services Branch, Public Works & Government Services Canada.

Mr. Turner requested that the CMA and like-minded experts in the Canadian public, private and academic sectors, collaborate in preparation of an analytical and consensus-building process towards a dependable, peer-reviewed, accredited standard on IM/IT full cost/benefit accounting methodology by March 2005. He explained the need for such a formal standard for IM/IT to generate the financial information feedback required for decision-makers to learn from experience. He highlighted core documents from several sources as providing the foundations for Canadian federal participation in work towards drafting such a standard for IT initiatives:

#### Treasury Board Secretariat

- Accrual Accounting:  
Report the true cost of programs, improve accountability.  
[http://www.tbs-sct.gc.ca/fin/sigs/FIS-SIF/ord-adp/ACRLACT\\_e.asp](http://www.tbs-sct.gc.ca/fin/sigs/FIS-SIF/ord-adp/ACRLACT_e.asp)
- Guide to the Costing of Outputs  
A model for costing outputs, with definitions, concepts, steps.  
[http://www.tbs-sct.gc.ca/pubs\\_pol/dcgpubs/tbm\\_133/guide\\_e.asp](http://www.tbs-sct.gc.ca/pubs_pol/dcgpubs/tbm_133/guide_e.asp)
- Benefit/Cost Analysis Guide:  
Formal decision techniques that are clear, systematic and rational.  
[http://www.tbs-sct.gc.ca/fin/sigs/Revolving\\_Funds/bcag/BCA2\\_e.asp](http://www.tbs-sct.gc.ca/fin/sigs/Revolving_Funds/bcag/BCA2_e.asp)

#### Canadian Institute of Chartered Accountants

- Public Sector Accounting Standards  
[www.cica.ca/index.cfm/ci\\_id/225/la\\_id/1.html](http://www.cica.ca/index.cfm/ci_id/225/la_id/1.html)

#### Canadian Society of Management Accountants (CMA)

- Management Accounting Standards  
[http://www.cma-canada.org/index.cfm/ci\\_id/140/la\\_id/1.htm](http://www.cma-canada.org/index.cfm/ci_id/140/la_id/1.htm)
- “Cost Finding Standards” address the basic cost information needed to support operational and strategic decisions;
- “Cost Using Standards” address operational and tactical management accounting methods to support decisions

#### International Federation of Accountants (IFAC), IT Committee

- IFAC Handbook of International Information Technology Guidelines

The details of accounting and cost/benefit analysis are not well known to civil servants who are most frequently responsible to prepare business cases for the development and management environment for IM/IT projects. In discussion it was noted that even the CIO Branch's Federated Architecture Program ("Principle 7") referring to "Total Cost of Ownership" needs to be corrected to conform with higher level TBS guidelines.

Mr. Turner suggested for general consideration a collaborative effort to design and develop a "reference implementation" application for the financial and economic planning and analysis of IM/IT projects called "IM/ITator". This generic reusable software component would support the consistent application of cost/benefit analysis in the planning of public sector IM/IT Initiatives. Usability would be similar to off-the-shelf income tax software, such that complicated elements (business rules from policies, guidelines & standards) would be maintained "behind the scenes" by authorized administrators.

During discussions, Mr. Rhaman of Deloitte commented that the reusable reference implementation for applied cost/benefit analysis outlined by Mr. Turner implies a revolution in public sector software thinking. He suggested that the IM/ITator concept could be linked with the with Software Engineering Institute's "Capability Maturity Model" (CMMI). He noted that the application could solicit information from users at low, medium and high levels of comprehensiveness, depending upon the user's directorate or department level of IT management maturity.

## **Featured Guests**

### **How To Conduct Effective Cost Estimating For Better Project Management Of Your IT Implementations**

**Abhay Raman** is a Manager in the Ottawa office of Deloitte and Touche, and a consultant on the project team for Treasury Board Secretariat's Expenditure Management Information System (EMIS).

Mr. Raman compared and contrasted several methods for estimating the size, complexity and costs of IM/IT projects. One of the most useful approaches, he commented, is the ISO standard for the "functional sizing" of business administration and management software, called "COSMIC Full Function Point (FFP)" methodology based on seminal work by Alain Abram at University of Quebec. The COSMIC/FFP standard is managed through the "Software Systems Engineering" Sub-Committee ( JTC1/SC7). During discussions, a participant asked if valuation based upon Full Function Point methodology might



inadvertently reward complexity, due to the direct relationship it sets between value and the number of function points, without adjustments for simplicity and elegance.

Raman outlined the rationale of the so-called "Agile Method" [www.agilealliance.org](http://www.agilealliance.org) and [www.martinfowler.com/articles/newMethodology.html](http://www.martinfowler.com/articles/newMethodology.html), and one of its variants, "Extreme Programming" [www.extremeprogramming.org](http://www.extremeprogramming.org) (XP). The use of agile methods engaged by Deloitte involves iteration between studying business purposes, and estimating requirements. He outlined how to use indicators based on objectives from team-learning processes, which are central to Agile Methods.

The way each objective is stated can be key to achieving "useful success", and even "useful failure". He commented that poorly-stated objectives can lead to success that is useless, and failures from which nothing is learned. Later in discussion, a participant noted how Chapter 1 of the Auditor General's 2003 report specifically took issue with poorly stated objectives in IT initiatives. Working in two groups, Raman had participants consider categories of objectives for two hypothetical IT projects, for which value indicators could be developed.

### **Getting Value for Your IT Dollar**

**Jim Johnson** is Founder and Chairman of The Standish Group, a globally respected source of high quality, independent primary research, and analysis of IT project performance.

Mr. Johnson provided participants an overview of the latest edition of the CHAOS Chronicles, which condenses nine years of research through focus groups, in-depth surveys and executive interviews on project performance of over 40,000 completed IT projects. The objectives of CHAOS research are to document the scope of application software development project failures, the major factors for failure, and ways to reduce failure.

He was pleased to report that the proportion of projects reported as "failed" has dropped from 40 per cent in 1996 to 15 per cent in 2002, although those reported as "succeeded" rose only from 28 per cent to 34 per cent. The increase has been the "challenged" projects category, those that are significantly over budget and overdue. In the latest study, US/European/Canadian federal government projects taken together had the highest "failed" rate (26 per cent, compared with 7 per cent in the retail industry), and also the highest "challenged" rate (61 per cent) among sectors. "Challenged" refers to projects that are completed and operational but over-budget, that are over the time estimate, and/or that offer fewer features and functions than originally specified. This leaves only 1 out of 8 federal government projects being completed on-time and on-budget, with all the features and functions initially specified.

If these proportions are at all indicative of federal government IT project

performance in Canada, then of the \$6.5 billion spent each year on IM/IT by the Canadian Government, one might consider that roughly \$1.5 billion per year may be going into projects that end up canceled, and \$4.0 per year may go into projects that run overdue, that go over budget, or that need to get scaled back. Only half a billion a year may be getting spent according to plan! We do not know if these projections are high, low or similar to actual results, because the Government of Canada is not tracking IT outcomes on this basis.

The top ten reasons for success identified through interviews and surveys with IT executives are:

- user involvement
- executive support
- experienced project managers
- clear business objectives
- minimized scope
- agile requirements processes
- consistent infrastructure
- formal methodology
- reliable estimates
- skilled staff

Federal governments in the US, Europe and Canada were generally reported to be doing well at selecting experience project managers, engaging formal methodologies, and relying upon consistent infrastructure. But they tend to do poorly at minimizing scope, applying agile processes, setting clear business objectives, or obtaining reliable estimates.

Mr. Johnson provided an outline of the Standish Group's work with the UK's Office of Government Commerce (OGC) to set up an IM/IT project assessment and "gateway" process. OGC's focus has shifted beyond cost management, to value maximization and risk management. He emphasized that cost and risk management must be supportive of the value objective. This leads to indicators such as a risk-adjusted return on investment (ROI). He outlined the web-base set of analytical tools Standish now provides as a service, called VirtualAdvisor. Backed by data from 40,000 projects, and including a questionnaire for project managers that addresses issues of management culture, the requirements identification process, involvement of end-uses, and so on, it is used by customers to assess risks, costs and ROI.

## **Developing An Approach For Evaluating Software Quality Prior To The Purchase**

**Khaled El Emam** is President of the Ottawa Software Quality Association, and a Senior Research Fellow with the National Research Council of Canada. He is co-editor of an ISO project to develop a standardized software quality measurement process, and he leads the IEEE “Software Engineering Body of Knowledge” project.

One of the difficulties with sole reliance on the direct costs of software is the frequency and degree of difference between promise and performance. This difference shows up mainly through indirect costs, whereas the response to problems will be evident as direct costs. Expenditure management based only on direct costs will limit spending (direct costs) needed to correct performance or quality problems, even if the impacts (indirect costs) of these problems are orders of magnitude greater. These costs are externalized to clients, partners or citizens, and financial incentive towards performance and quality improvement is scattered.

Reliable empirical measures and indicators are required to adjust internal public sector costing for productivity and performance shortfalls. El Emam summarized current software quality research, and outlined checklists, criteria, decision aids for evaluating the quality-related costs that would need to be estimated to move beyond direct IT costs.

### **Full Cost Accounting Principles & Practice: A U.S. Government Perspective**

**Lloyd Blanchard** is Senior Advisor and Deputy CFO, Financial Management, National Aeronautics and Space Administration (NASA). He was formerly the COO of the US Small Business Administration.

Mr. Blanchard outlined how the 1993 US “Government Performance and Results Act” (GRRA) introduced a shift from traditional budgeting to “performance budgeting”. This addressed the budget structure, rather than the amount. It brought Full Cost Accounting to the centre of US federal budgeting and performance integration.

For the same reasons driving work on the Government Strategic Reference Model in Canada, the US administration found it had to start from the top to describe what it is doing, then measure what it is doing. Without these steps, it would be hard to monitor performance. Blanchard outlined organizational considerations that affect the management, budgeting and accounting functions, since the use of full cost accounting requires a commitment to align a wide variety of indirect resources with the direct cost centres. FCA monitors both direct and indirect resources dedicated to each program area. These statistical measures are not enough, he added. One also needs to understand the business drivers and cost drivers.

FCA is still new at NASA, and while it is a key element of budget-performance integration, he said it is hard to accomplish. Methodologies differ among federal organizations, and Blanchard compared his earlier experiences using a “surveying approach” in the federal Small Business Administration, with what he considers a more cost-effective “attribution approach” that he more recently introduced at the National Aeronautics and Space Administration (NASA). He commented that the practical problem with the surveying approach is summed up in Parkinson's Law: “Work expands to fill the time available for its completion”.

Blanchard admits the statistical allocation method used at NASA is a rather “top-down, power and muscle” approach. But his team tells operations branches: “If you help us do full cost accounting, we will save you money. This will free up money to let you do what you need to do.” Incentives drive everything, he said, “The dynamic is really driven by how you report your costs.” Contrary to the impression that improved accounting control would centralize decision-making, the federal management agenda seeks to advance budgeting in a way that allows departments and agencies to be more flexible, even “shielded” from micromanagement by Congress.

Common accounting services arrangements are negotiated to balance corporate requirements with lower-level requirements. Individual managers cannot afford corporate level costs, but they can effort their project costs. Therefore costs are allocated according to usage, with the occasional need to adjust the rates. Better planning is reflected in fewer adjustments, or more minor adjustments.

### **Foundations of FCA in PWGSC's Acquisitions Transition Policy**

**Glen Carswell** is the Software Commodity Manager in the Software and Shared Systems Procurement Directorate, Acquisitions Branch, Public Works and Government Services Canada (PWGSC).

Mr. Carswell explained the utility of full cost accounting methods for improving the software acquisitions function. He noted that PWGSC handles the acquisition of approximately \$2 billion per year in information technology. This includes \$900 million for hardware, \$350 million for royalty-based software, and \$650 million in IT professional services.

About 4,000 transactions per year are for the acquisition of royalty-based software. This suggests that the scale of administrative “transaction costs” associated with royalty-based software are considerable, but since they are indirect costs, they are rarely accounted for. Additional considerations include the costs of file format conversions, the costs of warranty enforcement, license and installation management, and others. FCA methods that would reveal such costs are already anticipated in PWGSC's Transition Policy, and in the Government of Canada's first

CIO blueprint (1993).

Treating software as a consumable, rather than as an investment with the expectation of a return, can lead to a false impression that increased software spending indicates increased benefits for the organization. Information on downstream costs and benefits needed to validate the actual return on investment may not be collected, leaving the competitive procurement process short of data needed to select according to the best value for money.

Bordering the full cost accounting theme, some participants discussed the so-called “March Madness” problem. This is the name given to the incentive at the end of each fiscal year for managers and directors to quickly spend out their remaining budgets on low priority goods and services, in order to avoid executive pressure for allocating a reduced budget in the following fiscal year. One method suggested was to keep the current year's actual expenditures confidential until the new fiscal year's budget allocations are made. Another option was to create a financial instrument that, in effect, would permit directors to carry over their current year's surplus to the following fiscal year. The connection with full cost accounting is that elimination of March Madness will facilitate better management controls on that portion of government expenditure.

### **Full Cost Accounting at UCLA**

**Judith Freed** is the Business Applications Manager in the Administrative Information Systems group, University of California Los Angeles (UCLA).

Ms. Freed provided an account of steps taken at UCLA to assess baseline costs for the entire IT portfolio, and to estimate indirect costs. The Information Systems Group initially engaged Deloitte & Touche to develop a Full Cost Accounting Model. The approach is now used to report to clients through monthly statements under each service line. The broader scope of financial reporting has led to better cost management, and it improves relationships with stakeholders, as they gain a better understanding of IT decisions.

The steps towards full cost accounting at UCLA are limited. Indirect costs are currently projected from information that is being gathered on direct costs. It is recognized that this approach has important limitations, since it cannot capture the differences in indirect costs that can distinguish alternative project designs. Furthermore, external costs are not being addressed at this time. But the groundwork is laid, and reporting to clients proves valuable. A standard on full cost accounting methodology would help towards extending the work to capture indirect and external costs.

## **How To Evaluate Open Source Software In Order To Accurately Compare It To Alternatives**

**David Wheeler** is Senior Researcher at the US government's Institute for Defense Analyses (IDA [www.ida.org](http://www.ida.org)), and a contributor to the Common Criteria tests for software security. He is author of several books, including "Software Inspection: An Industry Best Practice" (IEEE CS Press) and "Secure Programming for Linux and Unix How To". Wheeler also maintains the widely cited online overview "Why OSS/FS? Look at the Numbers!".

The Institute for Defense Analyses is one of several "Federally Funded R&D Centres" (FFRDC) in the US, set up through an initial core funding contract, and sustaining itself through cost recovery for research and development under contract with other government organizations. IDA has 600 employees, of whom 60 are software professionals. The Cost Analysis Research Division (CARD) at IDA has a direct interest in full cost accounting methodology for IT.

Mr. Wheeler led participants through the steps of accurately comparing open source community solutions with corporate proprietary solutions. He emphasized that while the basic steps for both approaches are the same, the information available for each is different. Consequently, the methods differ for identifying options, and assessing them from a value perspective. Important attributes include functionality, cost, market share, support, maintenance, reliability, performance, scalability, usability, security, flexibility, and legal/license issues.

Statistics reported about open source project performance require thoughtful interpretation, said Wheeler. For example, it is often reported that the "abandon-rate" of open source projects is high. Yet this is consistent with a high rate of experimentation and transparency, not failure. Furthermore, small open source contributions are very often picked up and re-worked on new more integrated paths. Understanding reuse and adaptation is important to obtaining a reasonable view of ROI from open source. Reuse and adaptation increase when software implements international standards from accredited standards bodies. The properties of "standards" are outlined in the Department of Defense "Information Standards Repository", which is part of the DoD JTA (Joint Technical Architecture). This references the WTO Agreement on Technical Barriers to Trade.

Wheeler's organization has confidence in the GNU-GPL as a reliable licensing arrangement, in part, because it is well grounded in copyright law. Ultimately, he stated, if the Berne Convention's copyright protections fail in relation to the GPL, then copyright fails for all proprietary licenses too. For organizations that engage both corporate proprietary and open source licensing, he referred to a MITRE Corporation report for the US Defense Department that describes four techniques for legally combining software under corporate proprietary and GPL terms. He also mentioned that the prologue of the GPL is important to understanding the license. He suggested that Government of Canada consider the merits of collaborating on

adapting or interpreting the GPL language for Canadian law, and mentioned that the University of Ottawa's Institute of Law and Technology has started researching this.

During discussions, Wheeler suggested that certification costs of major open source software solutions (for example, the costs of investing in a Common Criteria security evaluation), ought to be substitutable within an acquisitions process for the cost of purchasing a corporate royalty-based license. The government could also consider pooling funds with other governments, towards achieving the security certification of selected open source off-the-shelf solutions.

### 3. Workshop Discussions

#### **3.1 Some Good Questions For FCA To Answer: Four Case Discussions**

**Joseph Potvin** is a senior economist and IT architect, serving as a member of the management team for the Enterprise Architecture, Standards and Security Unit, IT Services Branch, in Public Works and Government Services Canada.

Potvin facilitated four case-based group discussions to identify some of the questions that FCA is suited to answer. Developed from genuine public sector events and projects, these cases addressed:

- Case 1: Associated Management Costs;
- Case 2: Selection Criteria Relating to Intellectual Property Access;
- Case 3: Benefits of Cost-Sharing; and,
- Case 4: Liability When Things Go Wrong.

Each of the cases is provided below, as circulated at the workshop, followed by synthesized notes from the discussions. Discussions were facilitated through the provision of specific questions, however each of the synthesized reports is structured according to the themes and directions of the dialogue that occurred.

*Rapporteur's Note: In writing this synthesis, I have been fortunate to work from rich notes made by several of the participants in each of the groups. I collected, and later transcribed and structured their notes into logical sections and paragraphs. In the current version of this report, the results have not yet benefited from follow-up contact with participants for clarification or correction of errors. While the content of this synthesis has been kept very close to the original notes, the process of creating such an account involves employing one's own cognitive framework, and subject comprehension. Every attempt has been made to stay true to what participants said. I hope the result is recognizable to them, and useful to others.*

Joseph Potvin



"You Paid What?!!"

Workshop On Full Cost Accounting Methodology For Information Technology Projects In The Public Sector

**Focus Session: "Some Good Questions for FCA to Answer"**

8:30 am – 12:30 pm / 10 March 2004 / Ottawa, Canada

**Case1: Associated Management Costs**

Author: Joseph Potvin, IT Services Branch, PWGSC ©2004 Government of Canada

**The Supplier Wants a Software/License Audit**

On December 20 2001, Microsoft Canada called a meeting with Public Works and Government Services Canada (PWGSC) executives to request a complete audit of the number of copies of software and licenses from the company, across all 10,000 workstations in the department, to be submitted to the supplier by the end of May 2002.

Noting that the suggested timing would place the audit activity in the midst of the fiscal year-end, department executives suggested a mid-summer reporting date. Microsoft's representative responded that the company will be forwarding an official letter specifying the end of May, and that if the department needed more time, it could make such a request on that occasion.

The specific details of the company's full audit request came in a letter from Microsoft dated 24 January 2002. Referring to a 2001 preliminary review of software asset management processes by an audit firm retained by Microsoft (which visited PWGSC on 31 January 2001), Microsoft reiterated that it is imperative an inventory be completed at all branches, and a reconciliation be performed, in order to determine license compliance status. The letter stated:

"As we agreed in our meeting of December 20<sup>th</sup>, PWGSC will act on this recommendation immediately and provide Microsoft with a summary report by no later than May 30, 2002. The summary report will provide an overview of PWGSC's installation, use and licensing of certain Microsoft products and should provide the following information:

- the number of copies of Microsoft Office Suite software and individual application products, including Microsoft Project currently installed on PWGSC's computers (including the version number and edition of the software);
- the number of licenses that PWGSC has for Microsoft Office Suite software and individual application products, including Microsoft Project; and
- the number of concurrent licenses, if any, being deployed by PWGSC. In respect of any concurrent licenses, please provide details of the number of concurrent users accessing the software and how PWGSC limits the number of users accessing these concurrent licenses.

The summary should indicate the date of purchase of the license, the license that was purchased (including the version number and edition of the software), from whom the license was purchased and the applicable contract number, purchase order or invoice number."

PWGSC replied with its understanding of the terms of reference for work requested by the supplier, reminding them that the department cannot provide the information by 30 May due to the large number of ongoing projects, and the pressures of year-end. PWGSC committed to providing a summary report by 30 July, 2003.

Between February and July 2002 over fifty different people in the department played a role in the software license review (many involved only part-time). No specific budget was set up for the audit as a project. Instead it was accounted for as a combination of salary and professional services costs, incurred by several directorates across the department. The total cost of providing this information to the supplier has been estimated at around \$700,000.

PWGSC reported to Microsoft that, at the time the audit was completed, the department had paid for 2,961 more licenses (14,572) than it had installed Microsoft software applications (11,611) of all types, representing approximately \$1 million in overpayment. It should be taken into account that during the audit process, a significant number of unnecessary or unused Microsoft applications were removed from desktops. There was also some installation over-reporting error due to the fact that the semi-automated software detection service operating over the network obtained information from each computer's registry. Clutter in registries of computers that have not been rebuilt for a long time sometimes resulted in counting a single computer as having two instances of Microsoft Office installed where there was only one, and sometimes counted a Microsoft Office application as being installed, even though it had long before been uninstalled.

**Questions for Discussion:**

- When software licenses include provisions under which a government department becomes liable for significant license and intellectual property management or audit costs, should the estimated value of meeting these commitments be included as a component of the supplier's competitive bid price during the acquisition process?
- Is there a reasonable methodology for estimating associated license and intellectual property management or audit costs ahead of time?
- Is there a reasonable methodology for attributing previously unanticipated license and intellectual property management or audit costs to the related supplier agreements in the course of ongoing financial monitoring?

## **Case 1 Discussion Synthesis**

### Software Asset Management

The suggestion that a federated software asset management could save the federal government approximately 10% of the \$500 million per year it currently spends on royalty-based software licenses, attracted attention at the workshop. Participants discussed the need for Government of Canada to rationalize towards a common standards-based system for software asset life-cycle management, in place of today's disjointed reactive approach.

Three alternative approaches were considered towards consolidating government-wide software asset management:

- Include guidelines from the ISO/IEC JTC1/SC7 Study Group on Asset and Software License Management within the requirements for a software/asset management supplier solution for the Government of Canada. Suppliers would compete at the departmental and/or federal level in terms of price, performance, and service with their off-the-shelf or customized solutions;
- Together with external partners, architect and develop a GSRI (Government Service Reference Implementation) software/asset management solution that meets the above-mentioned ISO/IEC guidelines. Application development suppliers would compete at the departmental and/or federal level in terms of price, performance, and service to implement, maintain, adapt and extend the GSRI as required.
- Undertake a competition in terms of price, performance, and service to supply, maintain, extend and adapt a single off-the-shelf asset management solution for the federal government without reference to international standards, and migrate all departments and agencies to the same software, with the same supplier, under one license, for a specified period.

The software asset management system should include an inventory of the full texts of licenses that have have been accepted. In the case of corporate proprietary software and licenses. It should be easy for any user to find a license, a standing offer, or a service level agreements, giving them simple access to the knowledge of what licenses commit them to. Ad hoc cost increases can occur when audits discover compliance issues that users and administrators were not aware of. One participant observed that such a system could also help to eliminate a significant proportion of new corporate proprietary license purchases by facilitating reallocation of unused software, and supporting short-term installs/uninstalls within license terms.

Licensing models have become a fundamentally important element of competition amongst suppliers, and a significant determinant of software asset management costs. Some participants emphasized that at procurement time, the acquisition process should always include an assessment of the full costs and benefits of the proposed licensing type. This would be greatly facilitated by a typology of software licenses, which can be collaboratively developed by Acquisitions Branch, IT Services Branch, and Department of Justice.

Participants discussed several corporate proprietary license types. They may be device-based license models, user-based models, or site-licensed models. There are usually time limitations or other restrictions relevant to certain vendors' licenses. They considered that shorter corporate proprietary license cycles (3-4 years) typically increase upgrade costs compared with longer life cycles (4-7 years). However the increased upgrade costs may be desirable if they lead to greater competition pressure or if more frequent upgrades result in demonstrably better performance. This is not an issue under free open source licenses.

Some participants warned that a software asset management system could easily become too complex, because different licenses are often required when updating from an old version to a new version of the same corporate proprietary software. Furthermore, if customers miss the license renewal date, some royalty-based vendors require the customer to purchase a new license.

Again, such complications are not an issue under free open source licenses. For this reason, some concern was expressed that corporate proprietary licenses impose a wide variety of administrative costs on customers compared with certified open source or free/libre licenses, which require no supplier-driven tracking or reporting of license or installation numbers.

#### Who is Responsible for Supplier-Imposed Software Asset Management Costs?

Participants explored whether it may be possible or appropriate for the government to shift responsibility for tracking the number of installs and licenses purchased to the corporate proprietary software vendors that impose the requirement.

This can be complicated, because different suppliers have different requirements for license compliance. One person suggested that if only certain types of licenses require audits, then the associated software under license could perhaps be designed to be self-auditing. The group realized, however, that vendor-managed audits should not give vendors more monitoring access to government's computing infrastructure than is reasonable.

At minimum, some participants felt that it would make sense to attribute any required software audit costs to the bids that suppliers submit, whenever the licenses or contracts require detailed tracking. In principle, increased

administration costs should not be incurred by taxpayers or by other suppliers because of burdensome auditing requirements of particular software suppliers.

### Fully Accounting for Obligations of Software License Agreements

Participants agreed that if a given software license agreement includes a legal requirement for the customer to conduct ongoing tracking and periodic auditing of licenses and installations, this also constitutes a legal requirement for the customer to keep good records. In the case study, the \$700,000 spent by PWGSC was really nothing more than the cost of an ad hoc approach to compliance with legal obligations that were undertaken back when the license agreement was accepted from the given supplier. It is unknown whether the ad hoc compliance was more expensive or less expensive than what the costs of systematic compliance monitoring might have been.

A legal requirement for license and software installation monitoring also constitutes a management requirement to build in a contingency factor based on likelihood that discrepancies may turn up during audits. Costing should include contingency costs to cover this risk, as part of the bid price.

There was agreement among participants that the competitive software acquisition process should treat legal and management obligations towards a vendor as component costs within that vendor's bid price. This is because, by accepting such a bid, the government is committing to undertake an expenditure to monitor and maintain a compliance record on behalf of that supplier.

The methodology for estimating these management costs should be based upon a standard on full cost accounting for IT that has traction both inside and outside government. Such a standard led by CMA/CICA could provide the methodology for estimation of human resources time and system costs required to monitor license holdings and software installations. It might include a contingency based on the approximate value of risks associated with compliance to licensing terms. The work of developing these license/installation management cost estimates, based on a CMA/CICA standard, should be borne by the suppliers and be included as part of the bid price. This step will create an incentive for suppliers to compete towards streamlining their license administration, and other business aspects.

One default approach to risk-management currently used by many departments and agencies is to over-purchase royalty-based software licenses. For example, at the end of the \$700,000 PWGSC audit required by Microsoft, the department was found to have paid for 2,961 more licenses (14,572) than it had installed Microsoft software applications (11,611) of all types. This resolves to a \$1 million contingency insurance cost in relation to this one vendor, on top of the monitoring and audit costs already mentioned. With this surplus spending approach to ensuring compliance, the department certainly won't be found coming up short with "illegal copies" of software! However, several participants would much prefer to

see this type of fiscal “leakage” stopped with a comprehensive government-wide software asset management system, as discussed above. That way, PWGSC could sell or at least attribute its \$1 million worth of excess licenses to one or more other departments or agencies who's audits show them coming up short on paid Microsoft licenses. Under the currently arrangements, PWGSC pays for too many licenses, and as the audit train moves around town, other departments are cornered into paying for even more of them.

The administrative demands of corporate proprietary licenses also make essential a vendor-neutral software audit and asset management methodology. Several participants commented that current techniques using network utilities to probe desktop registry files are suspect, because registries frequently contain false positives, usually attributable to faulty application uninstall routines. On Microsoft Windows operating systems, this same vendor, Microsoft, controls access to the system registry file, which means that it is not a neutral source of the audit information. This supplier-restricted access could bias reporting to the advantage of the supplier, and to the disadvantage of the government and taxpayers. (Most automated detection tools used in the Government of Canada are designed to scan Microsoft's Windows operating systems only, not competitors' Macintosh, Linux, or xBSD systems.)

One participant suggested more generally that corporate proprietary vendors have a logical interest in leaving false positive data in the registry, because these may be interpreted as illegal installs of their software. Follow-up by the vendor's lawyers can be effective in turning false positives into genuine sales, largely because the administrative cost in time and money required to check through and eliminate all the false positives can be more than the cost of paying the additional license royalty fees.

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**Focus Session: "Some Good Questions for FCA to Answer"**

8:30 am – 12:30 pm / 10 March 2004 / Ottawa, Canada

**Case 2: Selection Criteria Relating to Intellectual Property Access**

Author: Joseph Potvin, IT Services Branch, PWGSC ©2004 Government of Canada

**Option Value of Public Access to Knowledge Assets**

The SSDUE Project (Streamlining Service Delivery Using E-collaboration) is a "Pathfinder" initiative under Treasury Board Secretariat's "Business Transformation Enablement Program" (BTEP). Health, Justice, Solicitor General, Canadian Revenue Agency, and Public Works and Government Services Canada are experimenting with shared data management within the context of a highly granular access control and privacy regimen.

If successful, this project will demonstrate a business and technical architecture for collaborative data management that would be useful to many other horizontal initiatives of the Federal Government and its stakeholders.

SSDUE's joint data management architecture engages the ebXML (electronic business eXtensible Markup Language) standard, which is managed by the OASIS consortium, and is recognized by the Joint Technical Committee (JTC1) of the ISO and IEC. The Standards Council of Canada has the mandate to support Canadian participation in JTC1 standards development.

The ebXML standard is implemented in a number of competing "registry/repository" (r/r) software prototypes. On behalf of the SSDUE team, the IT Services Branch (ITSB) of PWGSC has been learning about several ebXML r/r prototypes since early 2003. PWGSC technical personnel have taken training on, and have been operating two competing prototypes on their in-house servers. This has enabled them to conduct a detailed comparative assessment in the course of pilot project operations. In part, the purpose of this effort has also been to learn what mandatory and optional criteria should be included in an eventual ebXML solution competition process.

It can be expected that any comparative assessment of ebXML r/r solutions would consider features and functions in relation to contract value, with a scope familiar to anyone who has ever gone through a software appraisal process. However, the two leading prototypes that ITSB reviewed in detail are offered on very different business terms that significantly influence value to the Crown, and it is not clear how this impact on value should be addressed in the competitive criteria.

One of the solutions, Yellow Dragon Registry (wholly acquired by Adobe in late 2003 for integration into its 'Intelligent Document Platform') was being offered under a royalty-based license, in binary, encrypted form. Government of Canada

does not have access to the source code. The other, FreebXML is offered on "libre" open source terms by Sun Microsystems, under an Apache Software License <http://www.opensource.org/licenses/apachepl.php>.

The practical significance of these two business and licensing models for the SSDUE pathfinder team became apparent during training. On separate occasions, the technical leads for each of the Yellow Dragon and FreebXML solutions were contracted by PWGSC to provide several days of technical training. During the Yellow Dragon workshop, Government of Canada personnel received training as users of the software, in both administrator and authenticated end-user roles. In addition to this, however the FreebXML workshop also provided government technical personnel a detailed introduction to the internal architecture and programming methods and code of the software, enabling them to freely learn from, and independently adapt, derive and/or redistribute the intellectual assets within the terms of the license.

The different business terms under which these two competing solutions are offered by private sector suppliers raises some important and interesting questions for IT decision-makers.

### **Questions for Discussion:**

**Discussion Note:** It is recommended that this discussion session focus on methodological issues, leaving aside policy issues. It can be for another venue to deliberate whether the Government's software acquisitions process should or should not value costs and benefits to the Crown associated with knowledge access or restrictions.

- 1. Is there a reasonable methodology available to assess the value to Government of Canada of the FreebXML functional architecture, programming methods, and code that Sun Microsystems makes available under license?

**Technical Note:** In 1994, the Canadian Institute of Chartered Accountant (CICA) started the Canadian Performance Reporting Initiative (CPRI, <http://cpri.matrixlinks.ca/CPRIoverview.html>), seeking ways to measure intangibles such as intellectual capital in organizations. They considered that "the current accounting model does not adequately deal with intellectual capital", and that conventional balance sheets present a distorted picture of value. CPRI sought the basis of a standard methodology for reporting on intellectual capital. CPRI has concluded that intellectual capital is a "value creating platform" for an organization. It recommends that this value be measured and reported on separately from traditional financial performance measures, which document value realization. In particular, CPRI recommends that a methodology of intellectual asset valuation should include:

- Value stream modeling;
- A value creation realization formula;
- Value creation capacity;
- Value creation from the perspective of the different stakeholders (customers, shareholders, suppliers, employees, and the broader community).

The Society of Management Accounts of Canada (CMA) also provides guidance regarding how to



account for the value of knowledge assets: Tanaszi, Margaret and Jan Duffy. 2000. "Measuring Knowledge Assets". CMA Canada: Toronto. An overview of current approaches to the accounting of intellectual assets was published recently by Queens University School of Business: Smith, Heather A., and James D. McKeen. 2003. Valuing The Management Function. School of Business, Queens University. Centre for Knowledge-Based Enterprises Working Paper.  
<http://business.queensu.ca/kbe/docs/Smith-McKeen%2003-10.pdf>

- 2. Is there a reasonable methodology through which a competitive procurement process can take account of the "option value" that Government of Canada gains through its licensed access to:
  - (a) Knowledge of the software's functional architecture and programming methods;
  - (b) Rights and opportunities for GoC personnel to learn from, adapt and make derivative works from the functional architecture and programming methods, whether in-house or in collaboration with others in an open market.

**Technical Note:** In 1974, Arrow and Fisher spawned a prolific line of economic research with the notion of "a quasi-option value having an effect in the same direction as risk aversion", which accounts for the possibility of acquiring and exploiting potential information at some future time. Their original focus was upon ecosystem option values, however the concept likely has more general implications. K. J. Arrow and A. Fisher, *Environmental Preservation, Uncertainty and Irreversibility*, Quarterly Journal of Economics, 89, 312-319(1974).  
<http://netec.mcc.ac.uk/WoPEc/data/Articles/tprqjeconv%3A88%3Ay%3A1974%3Ai%3A2%3Ap%3A312-19.html>

## **Case 2 Discussion Synthesis**

### **Understanding Access to Knowledge**

Participants in the workshop agreed there is genuine value in being provided legal access to knowledge (i.e. intellectual property rights, know-how, understanding of architecture) embodied in software. In this case discussion, they focused upon better defining the issues, and identifying guidelines towards a methodology appropriate to estimating that value.

Several expressed concern that the current "cost per point" acquisitions methodology used by the Government of Canada does not include the value of legal access to knowledge as a factor in software selection, except when fees are charged for this access. If legal access is provided without a fee, its genuine value is overlooked in the current methodology. The root of the problem, some participants pointed out, is that the current approach places too much emphasis on project-level, fiscal-year cost minimization, and not enough on enterprise-level medium-term value maximization. Most of the value of legal access to knowledge shows up where that knowledge can be reused, generally beyond the current fiscal year or outside given project, the at the enterprise level, and/or over several years. Legal access to knowledge should not be confused with mere exposure to the substance of a work that is encumbered by restrictive licensing or patents. One participant mentioned how several corporate proprietary suppliers are now

providing “read only” legal access to their software programming and architectural information. Some suppliers refer to this model under the misleading phrase: “shared source”. This approach exposes other organizations and individuals to intellectual property risk, because it does not permit them to learn from what they read. Under such an arrangement, technical and architectural staff who may learn anything by examining this code (intentionally, inadvertently, or even just possibly), risk making their employers liable to pay for that value, if it could be argued successfully in court that they later used the knowledge without permission and paying royalties.

In contrast, however, the present case study is about suppliers who make software knowledge genuinely accessible under “libre” licenses, as Sun Microsystems has done with FreebXML. This approach permits anyone to learn from and re-use the techniques and components, as well as to strip out and/or alter modules or functions, whether in-house or by under contract with any firm.

### Valuation of Access to Knowledge

Discussion proceeded to how the federal government could improve IT decision-makers' understanding and measurement of the value of legal access to knowledge. More than one person cautioned that value should not be reduced entirely to monetary terms. Their concern was with several technical and social advantages that cannot be communicated or decided upon effectively as financial issues. A diversity of value criteria need to be articulated, understood and assessed on their own terms. Decisions should include but not be limited to the financial aspect.

A methodology would also need to address weighting criteria. As imprecise as all of this would be, several felt nevertheless that distinguishing some approximate value judgments in their own terms would be an improvement over the current methodology that inadvertently ignores them, or that precisely monetizes them according to some ad hoc imputed financial estimate. Expressing non-monetary aspects inappropriately in monetary terms will obscure the value judgments that are actually being made, resulting in reduced transparency and accountability.

Participants agreed it will be difficult to produce a standardized methodology for value assessment encompassing different types of technical and qualitative indicators. But an approach that is based on standards from formally accredited standards bodies such as CMA and CICA would reduce the risk of interference from narrow interests. Some also discussed getting additional training in negotiation strategy and techniques for civil servants who are involved with software contracting and licensing arrangements, to help them become more effective in advancing the interests of all citizens and businesses and regions of Canada.

The group concluded that a set of methodology issues should be articulated by the Government of Canada so that the most important policy-relevant non-monetary values can be considered in IM/IT decisions.

### IT Comptrollership

Participants suggested that the Government of Canada should collaborate with provincial and private sector counterparts to draft a standard for IT value analysis that is in line with existing accounting governance processes and standards. A good place to start, one person suggested, is with a publication of the Canadian Institute of Chartered Accountants (CICA), entitled "Information Technology Control Guidelines" (3rd Edition). This is a practical guide to designing, implementing and assessing information technology value management controls. [http://www.cica.ca/index.cfm/ci\\_id/1004/la\\_id/1.htm](http://www.cica.ca/index.cfm/ci_id/1004/la_id/1.htm) CICA defines "control" as comprising all elements of an organization that support people in the achievement of the organization's objectives (resources, systems, processes, culture, structure and tasks). Control is effective if it provides reasonable assurance that the organization will achieve its objectives reliably.

CICA provides a technology-independent analytical structure to support IT decision-making, within a wide variety of organizational structures. This guideline addresses control objectives, minimum control standards, control techniques, and risk management. It outlines role-based (not position-based) control procedures for IT planning, acquisition, development, maintenance, support, security, business continuity, and disaster recovery planning. It also provides guidance on application-based control methods. These can be used in GoC's acquisitions processes, as well as other decision, development and reporting contexts.

The "Information Technology Control Guidelines" are based upon methodology of the broader CICA Criteria of Control (CoCo) Board. For more information, see the CICA publication: "Guidance on Assessing Control" [http://www.cica.ca/index.cfm/ci\\_id/3091/la\\_id/1.htm](http://www.cica.ca/index.cfm/ci_id/3091/la_id/1.htm).

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**Case 3: Benefits of Cost-Sharing**

Author: Joseph Potvin, IT Services Branch, PWGSC ©2004 Government of Canada

**Accounting for "Resource Amplification" and "Positive Externalities"**

The International Development Research Centre (IDRC) is a public corporation created by the Parliament of Canada in 1970 to help developing country scientists and communities find their own solutions to social, economic, and environmental problems through research, and to share the benefits of this research. Bellanet International Secretariat ([www.bellanet.org](http://www.bellanet.org)) is an international multi-donor initiative hosted by IDRC, dedicated to increasing collaboration within and among international development organizations, and developing country organizations, through effective use of information and communication technologies.

In 1999 Bellanet was contracted by IDRC to create a software environment that it could use to experiment with putting online the management and communications workflow of two small grants programs of the MINGA Environment and Resources Research Program.

Early on, Bellanet's project team made the business decision to architect the solution as a generic solution to handle any process with a similar workflow, with easy contextual adaptation. The decision was also made to go beyond the trilingual requirement of MINGA (English, French and Spanish), to architect an extensible multilingual solution, to which administrators could easily add new language modules. Most importantly, the decision was made to share the solution with the world under a certified open source license, with the intent of turning the project from an expenditure into an investment.

The result is Online Proposal Appraisal (OPA), a full-featured multilingual web-based proposal appraisal system suitable for the end-to-end administration of any proposal request, submission, appraisal, selection and budgeting process, through to reporting, report review, approval, dissemination, and discussion. OPA provides a central repository for all the correspondence and information leading to decisions, which otherwise falls through the cracks or gets buried in personal filing cabinets or computer hard drives. OPA is suitable for:

- Grant & loan programs
- Screening of applicants
- Project tendering processes
- Policy proposal consultation
- Calls for conference papers or journal articles
- Any initiative with similar workflow processes

In autumn 2000, OPA Version 1.0 was completed ahead of schedule and delivered under budget. The documentation and code were published for download to the world on Bellanet's website <http://www.bellanet.org/opa> under the GNU General Public License <http://www.gnu.org/copyleft/gpl.html>.

During an early demo, several IDRC program officers discussed how it could be adapted to assist in streamlining practices within the Programs Branch for idea generation, team consideration, and decision-making. They believed it could advance the implementation of the corporate project management system across IDRC headquarters and regional offices by streamlining data input, and ensuring greater consistency of the data input. Thus in 2000, IDRC issued a small contract to Bellanet to adapt a version of OPA to enable IDRC's globally-distributed virtual teams to work as a community of peers to propose and learn of project ideas, to consider projects at preliminary pre-approval stages, and to advance new projects into the corporate project management system. In OPA-IDRC, project proposals are organized by fiscal year for each program initiative, and ongoing project budget commitments are monitored. When improvements needed by IDRC were considered to be of generic use, these were implemented as minor updates to OPA Version 1, and published for download. Within months, several hundred downloads of OPA had been logged from around the world, including insurance companies, public sector agencies, universities, and banks.

In early 2001, Bellanet was offered a small contract by The World Bank. This was to advance OPA's financial management integration to meet the needs of the new Global Development Network (GDN [www.gdnet.org](http://www.gdnet.org)), an international network of research and policy institutes. Since then, OPA has been used for online management of the world's largest international competition for research funding on global, national, and regional development. [http://www.gdnet.org/pdf2/surveys/awards\\_report\\_2000-03.pdf](http://www.gdnet.org/pdf2/surveys/awards_report_2000-03.pdf) All of the Bank's requirements were implemented in a generic way into OPA Version 2.0, and published for download on the Bellanet website.

Given the original lead developer's skill set in 1999-2000, this 'libre' open source application was first implemented for the royalties-based environment he was most familiar with: Allaire's ColdFusion (CF) Webserver (now Macromedia), a Microsoft Access database, and a Microsoft Windows Server. Only the OPA-CF 1.0 documentation, architecture and code were available free and open source.

In 2002 a small company named KiNcite ([www.kincite.com](http://www.kincite.com)) in the Netherlands informed Bellanet that it had begun work with colleagues in Uganda to re-create OPA 2.0 using the PHP [www.php.org](http://www.php.org) web application environment and a MySQL [www.mysql.org](http://www.mysql.org) database, running on an Apache webserver [www.apache.org](http://www.apache.org). KiNcite provides IT services to non-profit organizations in cooperation with technology professionals in developing countries. Technical

specialists in Bellanet, and from a team in Human Resources Development Canada (HRDC) that were borrowing some components for their own work, assisted with bug fixes and code clean-up in the early version of OPA-PHP. However a more thorough quality control cycle is still required to reach the level of stability of the original Version 2.0.

Also in 2002, Omoli Inc. [www.rozina.com](http://www.rozina.com), a US/Canadian IT consulting firm with its main office in Flanders, New Jersey, and a second office in Toronto, Canada, needed software for cataloging requests for software services, and for cataloging and reviewing resumes sent to them in response to these requests. A search of the Internet took them to [www.bellanet.org/opa](http://www.bellanet.org/opa) and a description of OPA. They downloaded the package and set up a proof-of-concept of the ColdFusion system using a demo application server from Allaire. Once they were satisfied that OPA-CF 2.0 had the kernel of a robust application environment, they committed resources to recreate OPA as a Java-MySQL-Apache application. This conversion was completed in November 2003, and shared back free to the community. Now OPA-Java 2.0 is cross-platform.

Omoli is currently running two internal systems based on OPA-Java: Applicants System (their original need), and a Project Time Tracking System (an enhancement to the original OPA template). In addition, they are now equipped to offer support services to others interested in implementing OPA-JAVA  
<http://www.omoli.com/opa>

To the extent a project like OPA is successful in having other organizations select, implement and add to the software, it engages a community of architects and programmers who perceive a self and/or community interest in contributing to further development. These other organizations also become stakeholders in a quality assurance community that shares an interest in testing, bug reports and bug fixes. An Internet-based international, cross-sector, cross-industry implementation community can demonstrate the solution's innovative adaptation to contexts that would not have occurred to the original development team, or to any one partner acting alone.

Currently, Canadian Government departments and agencies do not account for the returns from this phenomenon, known as "resource amplification". Without a reasonable assessments of these benefits, the cost/benefit analysis of converting a software development expense into an investment through commons-based peer production will undervalue the return on investment (ROI).

This is important at the moment because Public Works and Government Services Canada is considering an upgrade to the Knowledge Exchange Service (formerly the "Software Exchange Service"), to facilitate community development of other Crown-initiated software solutions, such as OPA, FreeWRL, VoiceCode, and others. Similar initiatives are underway in the US General Services Administration ("Components Registry", or CORE) and in the European Commission ("Pooling of

Open Source Software”, or POSS).

**Questions for Discussion:**

- Is there a reasonable methodology to account for the "resource amplification" that OPA attracted to Bellanet in the form of cost-sharing, knowledge-sharing, and risk-sharing from other public and private sector organizations?
- Is there a reasonable way that potential returns from "resource amplification" might have been anticipated in the original project plan, in light of the mandates of both IDRC and Bellanet (first paragraph above)?
- Is there a reasonable methodology to account for the "positive externalities" that OPA's generic reusable architecture provided directly to the corporate level of IDRC, The World Bank, and the variety of developing country organizations that have used it? Is the value acquired by these organizations through adaptive re-use of OPA closely enough related to Bellanet's mandate to warrant being formally included in the original project's ROI?
- Considering Bellanet's mandate, would it be reasonable for the accounting of "positive externalities" to include the involvement of developing country software engineers, such as the Ugandans engaged by KiNcote?

**Case 3 Discussion Synthesis**

**Basis for Comparison**

Several participants agreed that the valuation of cost-sharing, knowledge-sharing, and risk-sharing that is successfully attracted to an open source project from other public and private sector organizations, needs to be grounded in comparable transactions for money. Two methods were considered: “royalty cost avoidance” and “development cost avoidance”.

“Royalty Cost Avoidance”: Accountants impute value by comparison with a stream of royalty and service payments towards licenses that would otherwise be paid for corporate proprietary off-the-shelf software offering similar features and functions.

“Development Cost Avoidance”: Accountants establish the value by estimating what it would have cost to pay for in-house or out-sourced custom software development improvements and related services.

### Relating Accounting Scope to Business Objectives

Participants discussed the importance of establishing whether or not the business case for a project includes the solicitation of external participation and/or the extension of its benefits to others. They felt that if the business case for a project was solely to meet an internal requirement through internal resources, then it would not be appropriate to take account of any contributions received from, or any benefits provided to other organizations. But if a conscious management decision is made to seek external collaboration and/or achieve external benefits, then they felt that a methodology to capture these items should be developed. In that case, one should also account for costs incurred towards developing and maintaining these external collaborations, whether informal (such as ad hoc email communications), or formal (such as running a collaborative software engineering site).

This would make ROI estimates dependent upon the variable scope of perception of one or another project manager, and it underlines the importance of establishing a stable cost/benefit accounting standard. Without a the consistency of a standard applied across all IT projects of an organization, the reported ROI could be higher or lower according to whether or not a project manager takes a broad or narrow view of the business, or upon which of several decision-maker the accountant might communicate with.

Implementing a full cost/benefit accounting standard for IT may require a change in management context, and even a change in the IT architectural framework, to look beyond a single project or single departmental perspective, to a government enterprise perspective, or to an industrial and socio-economic perspective.

Some of the participants commented on the need to establish the intent of the accounting effort. Is it for comparing and managing ROI? For measuring efficiency and effectiveness? For reporting on annual performance? For public relations? The level of investment towards generating accounting information needs to be appropriate to its practical utility.



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**Case 4: Liability When Things Go Wrong**

Author: Joseph Potvin, IT Services Branch, PWGSC ©2004 Government of Canada

**PWGSC Headquarters Goes Two Weeks Without Email**

For a full two week period between 17 and 30 May 2002, the internal email service of Public Works and Government Services Canada (PWGSC) was down or intermittent throughout the national capital area. This seriously affected the normal flow of business in both operational and policy environments, with some 'guesstimates' putting the costs to taxpayers of lost productivity at more than \$20 million.

On the 10th day, the cause of the failure was determined to be a "bug" in Microsoft's Exchange 2000 software. Specifically, it occurred in the access control function when an attribute exactly 32 Kb in size was mishandled by Exchange. The programming code should have provided that if the attribute is "less than or equal to" 32 Kb, then it would load that information, and if it was "more than" 32 Kb, it would not. A Microsoft programmer inadvertently left out the "...or equal to" part, so that any access control attribute that was equal to exactly 32 Kb would crash the server. A fix was provided by Microsoft on the morning of 28 May, and all systems were brought back up over the following three days.

Service Level Agreements with software integrators and suppliers generally provide that in the case of a system failure, the supplier will make its commercial best effort to resolve the problem. Over the course of the outage, both public and private sector personnel worked to a highly demanding 24/7 response schedule. Microsoft provided several specialists from Rapid Onsite Support, Microsoft Premier, and Microsoft Consulting Services. Also, personnel from Microsoft's Exchange and Engineering teams in Redmond were involved by email or phone throughout the process, and at one point were monitoring the servers remotely. Experts from other suppliers such as Compaq, Hitachi, IBM and Novell dedicated resources to help establish if any of the supporting components of the mail system were at fault.

A "commercial best effort" can be said to have been made to resolve the problem at the time by Microsoft and the integrator that held the contract with PWGSC. Therefore, the cost of the software bug's impact was left for the Government of Canada to absorb, and to some degree, the other suppliers who assisted with the diagnosis. However a formal estimate of these costs to the Crown has never been made, and the financial records do not attribute any estimate of the actual costs to the known cause. Instead, the incident quietly added tens of millions of dollars of background pressure onto operations budgets throughout all of PWGSC.

**Questions for Discussion:**

**Discussion Note:** It is recommended that this discussion focus on the generic cost accounting issues highlighted by the case above, not considerations about potential liability.

- Is there a reasonable methodology by which the direct and indirect costs of major information technology system failures should be estimated?
- When significant costs of information technology system failures are absorbed by federal government departments and agencies, should the damages be estimated and reported in connection with the parties or projects known to be responsible, even when they are not held liable for cost recovery?

### **Case 4 Discussion Synthesis**

#### Critical Versus Non-Critical

The group discussed classifying each IT system with a criticality indicator, say 1 through 5, based upon management decisions regarding the importance of maintaining the given system free of performance failures. Each criticality ranking would have associated service level and event response guidelines. On the case study, someone commented, “We should know before we start, whether or not email is critical”. If so, another suggested, “Is 'commercial best effort' the type of wording that is good enough to protect the Canadian taxpayer?”

Contrary to suggestions in the case description, the majority view during discussions was that the interruption of PWGSC's enterprise-wide email system for two weeks in May 2002 was not a critical business failure. Taxpayers were not harmed, several said, since civil servants and others typically compensated for the loss of email by otherwise making good use of their time. While the problem was clearly a major irritant to end-users and caused some loss of time, they felt there was probably no significant consequence from the taxpayers' perspective. Several participants even commented that there may have been net benefits from this system failure, as they found they were able to ignore email for a period to concentrate on priorities with fewer interruptions, to organize files, to read reports, and so on.

#### Liability: Is the “Commercial Best Effort” Concept Adequate?

Information technology service level agreements (SLAs) typically require that a supplier make its “commercial best effort” to restore system services in the event of failure. Participants in the workshop generally felt that the 'commercial best effort' phrase needs to be defined effectively in terms of expected, measurable activities and time frames.

Participants also said that in spite of supplier performance agreements, they generally consider system failure costs due to software bugs or architectural failures to be unrecoverable in practice. Belief that an organization obtains liability

protection by relying upon corporate proprietary software solutions supplied by well-known suppliers, the group agreed, is generally unfounded, as this case actually demonstrated. The SLA offered no liability protection, and the software license was even a barrier to competitive troubleshooting.

Even without the “commercial best effort” clause, the distraction, time, money, and other resources that would be required to pursue, prove, win and enforce any significant liability claim generally outweigh the benefits of winning such a claim. They said it is far more effective to ensure due diligence up-front through fail-tolerant architecture and tested response protocols.

An effective system failure plan would include contingency options, a cost management strategy, and communications guidelines. That is to say, system architects and administrators should plan to fail well. If email really was critical infrastructure at PWGSC, the organization would have had such a contingency plan in place.

### Performance Bonds

Participants briefly discussed whether certain financial instruments could create effective buffers against critical IT system performance failures, and whether such instruments could be included directly in competitive bidding processes. One option discussed was the use of performance bonds, and in what way these might have an impact on the number and types of companies bidding for contracts, and on the cost of their services.

Rather than the taxpayer shouldering all of the risk, the costs of system failures can instead be split in a reasonable way between taxpayers and suppliers or contractors. It was suggested that performance clauses should frame pre-set penalties as risk-sharing, not punishment. In general, participants emphasized that for systems considered to be critical infrastructure, the benefits of effective failure planning must be recognized.

### Purpose Of Estimating Costs

Participants were not enthusiastic about estimating and attributing indirect costs to system failures. They suggested this would be difficult, in part because when failures do happen, circumstances and consequences are often unique. Some also felt that if supplier liability was not going to be pursued legally, then there would be little point in developing impact estimates. But others felt that reporting an estimate for losses from system failure in the project evaluations as well as in

the departmental and the Public Accounts and would be useful information to decision-makers and to citizens. Leaving these costs unreported makes it hard to demonstrate and analyze comparative return on investments (ROI).

No consistent methodology is currently identified by the government for losses due to IT failures, although the methods already in common use to establish damages in cases of civil litigation do provide useful guidance for general accounting purposes. Perhaps the proposed IT benefit-cost analysis standard will create a foundation for both consistency and simplicity.

### **3.2 How To Quantify The Value IT For Your Organization**

Facilitator: **Jim Johnson** , Founder and President, The Standish Group, Boston.

Mr. Johnson guided a participatory workshop designed to help participants better understand the balancing of cost, risk, and return on investment. Participants were provided indicators for a dozen functional elements of a hypothetical non-IT project. Each element was described in terms of its costs, its expected contribution to benefits, and an indicator of risk.

Three teams competed through several scenarios, exploring combinations of the elements, prioritizing them and eliminating some in order to meet budget limitations, target revenues, and acceptable risks. When the teams presented their solutions, Johnson had them work through stages of targeted cuts in total budgets, and levels of risk.

In conclusion, the teams outlined the rationale for each of their solutions. One team generalized their outcome in a graph relating ROI to risk. Another expressed a similar idea numerically with a Risk-Reward ratio ( $\$ \text{ Net Gain} / \$ \text{ Risk}$ ), and proposed two other indicators for comparative assessment of options: a “Mind-the-Gap Ratio” ( $\% \text{ Risk} - \% \text{ ROI}$ ); and, a Risk-Weighted ROI indicator ( $\% \text{ Risk} \times \% \text{ ROI}$ ).

This exercise demonstrated the process Standish works through with its customers. Using the VirtualAdvisor environment, project managers enter information about direct and indirect costs and benefits into a project file, and they complete a questionnaire related to management culture, involvement of end users, and variety of other risk factors. Based on data from 40,000 other projects already described in the database, VirtualAdvisor feeds back an estimate of the risk-adjusted ROI for the project, and indicates which of the many risk factors most affect the outcome. Customers are encouraged to create ways to implement changes at the project or organization level, and through iteration with VirtualAdvisor, they consider how these changes may affect the expected risk-adjusted ROI.

Johnson suggests that the Canadian Government consider creating a semi-autonomous “Office for IT Investment Planning”, operated on a cost-recovery basis, to provide the following services:

- Full cost/benefit accounting and analysis of all IM/IT expenditures
- Independent peer review of IM/IT project plans
- Tracking of IM/IT investment ROI
- Reporting of the facts to targeted audiences and to the public
- Research and description of best practices
- Certification of IM/IT initiatives

The Office of IT Investment Planning would need only minimal staff (5 to 10), and

could be backed by a small advisory council of respected experts nominated by industry associations or consortia (CMA; CICA; CATA; ITAC; AIMR; CSA). Several firms provide ROI and risk analysis services based on empirical performance data in the IT industry, so this could be competitively outsourced for 3-5 year periods. Johnson is confident that if effectively operated, such an office can save a minimum of 10 per cent of the Canadian Government's total IM/IT budget within the first two years – that is to say, more than half a billion dollars.

## Identification of Issues and Next Steps

Facilitator: **Michael Tinkler**, Society of Management Accountants of Canada

### Issues and Challenges Brainstorming Session

Participants identified the following questions in the course of this discussion:

- How much of an impact should we expect accounting methodology itself to have upon the way \$10 billion worth of IT decisions will be made by the Federal Government during its next four years?
- The quality of costing data depends to some degree on the categorization (coding) ontology of the accounting methodology. Is it better to organize by input? by project? by activity? What accredited standards apply to the coding, and to the data collection processes? Which standards bodies should be engaged?
- How will full cost accounting affect, or be affected by, political and lobbying influence?
- How should the costs of transition away from a incumbent suppliers be attributed? Who is responsible for the costs of staff retraining? Who is responsible for the costs of file format lock-in?
- Can full cost accounting help to tie software acquisition criteria more closely to international standards, as required under the WTO Agreement on Government Procurement, and the WTO Agreement on Technical Barriers to Trade?
- How can a transition to full cost accounting be government-wide, and still deliver results quickly? What are the “quick hits”?
- Is full cost accounting just part of “quality management”? Should IM/IT organizations in government work towards ISO 9000 certification? Should the finance functions in government be ISO 9000 certified?
- Is software to be considered a manufactured product, like hardware, with the investment capitalized? Or is software to be considered a written work, like a report, with the investment treated like research?
- Is it possible to distinguish the cost of delivering a service from the costs of internal administration?
- How is full cost accounting methodology affected by taking the perspective of

“the taxpayer”; “the citizen”; “the client”; or, “the shareholder”?

- To what extent does a transition to full cost accounting depend upon “culture change”?
- How would full cost accounting address cost-sharing economies achieved through consortia among departments? ...among governments? ...across sectors?
- What performance indicators should be included in a full cost accounting standard?
- How might full cost accounting be used towards the the design of better incentive structures under Modern Comptrollership?
- What can be done when decision-makers don't want to know what the costs are?
- Would full cost accounting affect the \$4 billion per year spent on IM/IT for federal public administration functions differently than the \$1.6 billion that is directed to IM/IT for services to the public?
- What is the role of subjectivity versus objectivity in full cost accounting?

## **Next Steps**

### Next Steps Discussed for the Government of Canada

- Participants would like the Government of Canada (the Office of the Comptroller General and other federal government stakeholders) to engage in the drafting process towards a CMA/CICA full cost/benefit accounting standard for IT. Such a collaboration provides an opportunity for the Comptroller to articulate how existing federal financial management guidelines and policies can be applied more effectively to the \$6.5 billion IT budget of the federal government. Stakeholders include the Department of Finance, the Financial, Comptrollership, Acquisitions, and IT Services branches within the several federal departments that carry major IT responsibilities, as well as the Office of the Auditor General. The Expenditure Management Information System project, and the Public Accounts of Canada Branch would benefit by keeping their teams informed on the substance of the emerging standard, as they are designing new data processing systems. The Procurement Reform initiative has a similar stake in work towards this standard. Federal Government participation in this drafting process does not require a large financial outlay. Rather it can rely primarily upon the dedication of current professional staff within government who have



related mandates and the knowledge required to identify methodological issues and to suggest resolution options for consideration through the CMA/CICA consultation process. On some matters, external experts will be helpful, and this can be addressed either through a single contract with the CMA/CICA towards advancement of the standard, or through a modest research budget managed directly by the Office of the Comptroller General.

- Participants suggested that mandatory criteria for IT acquisitions, and internal IT project proposals, should include conformance with the Treasury Board Secretariat's "Guide on the Costing of Outputs", its "Benefit/Cost Analysis Guide", which sets the bar as follows: "Government must achieve a return on investment (ROI) at least equivalent to what the money would earn if left in the private sector to justify taxing the private economy to undertake public-sector investments." (Section 5.5.2) Without consistent costing methods based on this and related core references from TBS, CMA and CICA, the financial components of bids and project charters are not comparable amongst each other, and they are out-of-step with government's financial planning needs. When it becomes available, the IT acquisitions criteria should include conformance with the CMA/CICA full cost/benefit accounting standard.
- In his presentation, Mr. Turner proposed the development of a free, open source "reference implementation" software solution that would greatly simplify and operationalize a requirement for conformance with TBS and CMA/CICA cost/benefit methodology guidelines. Such a financial planning application meeting all of these requirements can be made available without charge to bidders, as well as to in-house project teams. (Following the workshop, it was learned that a prototype for such a software utility has already been developed within Treasury Board Secretariat.) Participants in the workshop want to see this advanced as a collaborative project.
- Participants expressed the need for a communications strategy and workplan focused on raising conceptual awareness and operational understanding among federal IT executives and managers of the current and planned accounting control methods related to IM/IT. They suggested this should include raising awareness of the "taxpayers' perspective" used by the Office of the Auditor General.

#### Next Steps Discussed for the CMA

- Participants would like the CMA to initiate and maintain a forum on a full cost/benefit accounting standard for IT, and related guidelines. CMA was asked to engage other organizations, to solicit input around the country, and also to liaise on this topic with the CICA and the International Federation of Accountants (IFAC). Linkage with similar work in other administrations would also be useful. One participant referred, for example, to OMB's Cost-Benefit

#### Guide for Business Cases of IT.

- Some of the participants would like CMA to provide an overview of existing accounting standards relevant to IT, as well as some guidance on considerations for transition to a more comprehensive cost/benefit approach.
- The group asked the CMA to facilitate research on selected questions on accounting related to the open source business model in particular. Some of these issues raised in the case studies are not addressed directly in current TBS, CMA or CICA standards and guidelines. The open source business model has been bringing profound changes to the IM/IT industry, and it demands some innovative research by accountants.

**Annexes**

**Annex 1: List of Workshop Participants**

**Annex 2: Workshop Agenda**

## **Annex 3: Presentations**