

# Measuring Information Technology Investment among Canadian Academic Health Sciences Centres

LORRAINE PEDERSON AND KEVIN LEONARD

## ABSTRACT

Many recent studies have attempted to accurately measure the expenditure by hospitals in the area of new information technology (IT), for example see Leonard 1998 and Pink et al. 2001. This is usually done as an exercise to compare the healthcare sector with other industries that have had much more success in implementing and leveraging their IT investment (Willcocks 1992; Chan 2000). It is normally hoped that such investigation would help explain some of the differences among the various industries and provide insight into where (and how much) future IT spending should occur in healthcare (Leonard 2004). Herein, we present the results from a study of eight Canadian academic health sciences centres that contributed data in order to analyze the amount of information technology spending in their organizations. Specifically, we focus on one specific indicator: the IT spend ratio. This ratio is defined as the percentage of total IT net costs to total hospital net operating costs, and aims to provide a “relative (or percentage) measure of spending” so as to make the comparisons meaningful. One such comparison shows that hospitals spend only 55% of the amount the financial services sector spends.

## BACKGROUND

Canadian healthcare organizations are operating in an environment of heightened uncertainty. Change in several critical operating dimensions is actively being debated throughout the system, such as:

- funding at the provincial and federal levels;
- the role of private care and private funds;

- national reviews, standards and reforms to accountability and governance;
- shortages of healthcare professionals; and
- greater fiscal accountability.

As a result, the public and Ministries of Health are demanding more transparency of spending and higher accountability for results. As information technology (IT) threatens to become a major contributor to the overall budgets of healthcare organizations, it cannot escape increased scrutiny. In addition to IT being a visible accounting line item, healthcare IT investments are being scrutinized more and more on the basis of measurable performance improvements and contribution to the organization. In fact, Chief Information Officers (CIOs) and Chief Technology Officers (CTOs) find themselves under increasing pressure to defend the value proposition of IT.

## PREVIOUS STUDIES

Surprisingly, there have been very few similar studies that have been reported in the literature. In 2001, however, the Gartner Group’s IT benchmarking study of US companies reported that the IT budget, as a proportion of revenue (2001 budget data), was 2.92% for the “health services/hospitals” segment. They also reported similar figures for other industries:

- 2.46% in education
- 6.55% in financial services
- 6.84% in the IT sector

As can be seen, the health services sector spent only 45% (2.92/6.55) of the amount invested in IT by the financial services industry.

A second and perhaps more relevant study was conducted by Canada Health Infoway (October 2002) and reported the median IT expenditure as a percentage of operating budget as 1.8%. Their calculation differs from our study's ratio in two primary ways. First, this study generates a larger numerator value by including all IT costs regardless of where they occur within the organization. Second, the sample of 145 organizations surveyed in the Infoway study encompasses a wide variety of organizations (e.g., health regions, urban and rural organizations, academic and community-based organizations) with annual operating budgets greater than \$20 million. Our smaller sample represents solely academic health sciences organizations (within large urban centres) with larger operating budgets that may or may not spend more on IT because of their size and teaching and research focus leading to different IT spending rates overall.

A third IT investment study involved 20 Canadian teaching hospitals (Helyar et al. 1998; Hay Group 1999). The IT cost metric reported a range of values from 1.09 to 3.21%. This proportion is not directly comparable to the study presented herein due to large differences in the definition of what is included in IT spending. Within the Hay Group metric, communication costs were not included and only the costs found in the IT functional centre and IT costs tracked in a specific MIS account were included in their definition of total IT spending.

## RESEARCH DESIGN

This study had a descriptive, cross-sectional design comprised of two components:

- collection of retrospective (quantitative) IT financial data (complete fiscal year ending March 31st, 2001) from each of the health delivery organizations
- conducting "one-on-one" interviews with each participating CIOs (one from each health science centre yielding eight in total). These eight CIOs were utilized as key informants because of their knowledge and expertise in the management of IT and IT resources.

## SELECTION OF STUDY INDICATOR

In the spring of 2001, all of the health sciences centres' CIOs met to discuss the feasibility of the project, to define the objectives and to identify the specific metric(s) to be examined. They stated the following reasons for participating:

- a strong leadership role was lacking pertaining to the selection and development of IT performance indicators in Canadian hospitals;

- there was no widespread consensus on definitions of IT costs, performance and investments and no generally-accepted metric to measure relative performance within the industry;
- there was significant dissatisfaction with previous third party attempts to measure IT expenditure;
- there was a need to promote research that leads to a better understanding of the link between the value of IT investments and efficiency and how this translates to better health outcomes.

The existence of these "voids" then led to designing this research project with a primary objective of accurately measuring spending by hospitals on IT. The next step was to define specific metric(s) to study. The first round of discussions involved reviewing a comprehensive list of spending measures and performance indicators based on the literature and on relevant studies recently conducted by external agencies. This compilation from a variety of sources is presented in Table 1.

The CIO group reviewed and debated the merits of each of the metrics in Table 1, while weighing the following criteria:

- availability of the data required for each indicator's calculation;
- accessibility of data sources within the participating organizations;
- usefulness and relevance to decision-makers;
- capability to achieve meaningful and valid comparisons among the organizations.

From the comprehensive list (in Table 1), six IT spend indicators were then selected for further consideration as suitable and reasonable measures of comparison. However, we were unable to gain consensus among the eight hospitals on how we should calculate these six spending indicators. Therefore, after the review of these indicators and while recognizing the possible difficulties arising from standardizing data across eight organizations (pertaining to data availability and the time constraints and commitments), the group decided to focus their efforts on studying only one dimension of IT investment: *the percentage of net IT costs to total hospital net operating costs*.

It should be emphasized that any further detail or analysis was not feasible at this time. Due to many reasons (accessibility, comparability and commitment of the hospitals), it became evident that meaningful comparisons (across all eight health sciences centres) at a more detailed level would not be forthcoming.

## DATA SOURCES

To make valid comparisons of IT spending comparisons across organizations, a standard cost template for data collection and accompanying data element definitions

Table 1. List of Indicators Reviewed	
Scorecard Category	Indicator Description
Corporate contribution	<ul style="list-style-type: none"> <li>• Annual IS/IT budget as a % of total operating budget</li> <li>• IS net cost as a % of hospital total net operating budget</li> <li>• IS/IT annual operating expenditures (actual and/or budgeted)</li> <li>• IS/IT annual capital expenditures</li> <li>• % new IT spending to total spending</li> <li>• % old applications retired</li> <li>• ROI (return on investment); return on assets; payback</li> </ul>
Operational excellence	<ul style="list-style-type: none"> <li>• Average times between system failures; number of unplanned downtimes</li> <li>• % decrease in application software failures</li> <li>• % of computer availability; % of staff who have access to various systems</li> <li>• Average answer time of help desk; % of questions answered within set time</li> <li>• Timeliness of maintenance activities; cycle time for development</li> <li>• Salary ranges for key IT-related positions; number of IS/IT staff (FTEs)</li> </ul>
User (customer) orientation	<ul style="list-style-type: none"> <li>• Index (or score) of overall user satisfaction</li> <li>• Index of the functionality of applications</li> <li>• % of users satisfied with IT training</li> <li>• % of users satisfied with maintenance and support</li> <li>• IS/IT expenses per staff member (FTE)</li> <li>• % of service level agreements met</li> <li>• Index of user involvement in the development of new applications</li> <li>• % of projects using integrated project teams</li> </ul>
Future orientation	<ul style="list-style-type: none"> <li>• % of IS/IT budget devoted to training and development</li> <li>• Number of ongoing IT education programs; number of educational days per (FTE)</li> <li>• \$ available to support advanced technology skills development</li> <li>• Age distribution of IT staff; number of years experience per IT staff member</li> <li>• % IT employee turnover</li> <li>• % of IS/IT budget allocated to research</li> <li>• Number of applications younger than five years; number of applications per age category</li> </ul>
OHA: 'Use of information indicators' (1999) <sup>1</sup> Accreditation indicators	<ul style="list-style-type: none"> <li>• Clinical IT</li> <li>• Clinical data collection; dissemination; benchmarking</li> <li>• Intensity of information use</li> <li>• IT indicators as per Canadian Council Accreditation guidelines</li> </ul>
1. The calculation of each "Use of information" indicator is based on the allocation of points determined by responses to designated survey questions contained within the "Survey of system integration and change activities."	

was developed and endorsed by each of the participating organizations.

The indicator's numerator represented all IT-related spending and included the "full" costs of IT processes within an organization regardless of whether it is captured within the designated financial accounts of their IT department. Relying solely on cost data taken from select financial accounts was deemed unacceptable by the CIO group, as there may exist a wide variety of practices regarding the accounting of IT related spending. For this reason, a broader examination (and inclusion of certain departmental expenses) was required to capture all relevant IT spending. In other studies, cost data that have been extracted exclusively from IT-related financial accounts may not have resulted in a common representation of expenditures.

In detail, to achieve "full" costs, the following key cost categories were included:

- central IT department's operating costs (includes all

systems support, maintenance, outsourcing and lease costs);

- all IT support costs within other departments;
- communication costs;
- decision support and utilization management costs;
- clinical informatics;
- workload measurement costs; and,
- capital IT costs represented by a depreciation calculation.

This cost template became known as *Template A*.

There were concerns raised among a few members of the CIO group that the proposed costing model and template as designed did not appropriately capture costs at a functional level of IT processes (infrastructure, operations, clinical applications, business applications) and feared that the resulting data would only capture IS/IT costs found in standard accounts.

An alternative template, known as *Template B*, was also presented to the CIO group as a data collection option. *Template B* broke down costs into greater detail by type

of cost (e.g., hardware, software, salary, outsourcing, leases), broad functional category (e.g., clinical systems, business systems, infrastructure) and central/department management level.

Each CIO was asked to examine this alternative template and assess their organization's capability to gather the required IT cost data at this level of detail. The use of a detailed template for data capture was not supported by all of the members. Some felt that they were capable of providing only data at a higher level of aggregation because of insufficient resources available to research and access to the required data. This disagreement produced a significant quandary for the group: do we only use one template to gather cost data with a smaller group or two different data collection tools to maintain the full participation of the eight organizations?

To preserve full representation and participation in this analysis, we provided each organization the option to use either the high level Template A or the more detailed Template B to collect their cost data. This resulted in two separate datasets.

Table 2 summarizes how the sample (eight) breaks down based on type of organization and which template was completed. This tabular format is useful not only to illustrate how the sample is subdivided but it also provides a framework in the analysis of quantitative data and the interpretation of the findings.

There were three organizations that completed the

Type/Grouping	Template A: Summary	Template B: Detailed	Total
Acute services	2	3	5
Non-acute services	1	2	3
Total by template	3	5	8

summary (higher level) Template A and five organizations that opted to complete the detailed Template B.

The second aspect of data collection, a survey interview (which is provided in the appendix) with each CIO, was developed primarily to uncover the CIOs' perspectives on the process of benchmarking and its challenges. The survey was divided into three main sections:

1. demographic and background information on the organization and the respondents;
2. specific questions related to the organization's current IT infrastructure; and,
3. feedback on perceived relevance and use of IT benchmarking.

### KEY QUANTITATIVE FINDINGS

The IT cost data were analyzed to accomplish the following objectives:

- calculate the study indicator (e.g., IT spend ratio) for

each organization and by service grouping (acute and non-acute);

- examine the indicator's components to detect possible cost differences;
- develop a profile of IT spending and cost characteristics by type of service; and,
- hypothesize why there may be differences in these costs and what may be contributing to these variations.

In the cost profile of all organizations, we found that the average IT spend ratio (without depreciation) was 3.6% and the average value for total operating IT spending (as shown in Table 3) was \$9.5 million.

**Table 3.** Cost Profile (All Participants; n=8)

Study Variable	Mean	Median	Range
IT Spend Ratio <sup>1</sup> (%) (w/o depreciation)	3.6	3.1	2.6–5.3
IT Spend Ratio (%) (with depreciation)	5.0	4.6	3.5–8.1
Total IT Spend (\$M)	12.6	12.2	3.2–28.6
Total Operating IT Spend (\$M)	9.5	8.9	2.1–25.0
Total Capital IT Spend <sup>2</sup> (\$M)	3.0	3.6	0.9–4.6

1. IT spend ratio is the percentage of IT spending of Total Hospital operating spending.

2. The depreciation expense or capital spending calculated for this study reflects approximate values; for five organizations, capital spending was given for three years and for the other three organizations, a depreciation figure was provided.

In this analysis, the calculation of the IT spend ratio was done in two distinct ways: with an estimate of IT depreciation expense included or excluded. The inclusion of depreciation costs within the ratio was found to be problematic for two reasons: first, there was inconsistent availability of previous years' capital IT spending data (e.g., a straight-line calculation versus estimated value) across all the organizations, and second, it was perceived that different rates and methodologies for capitalization of this type of spending are being applied across the organizations. It is clear that these issues could result in inappropriate comparisons of the depreciation values contained within the indicator's numerator.

Table 4 outlines the overall IT spending patterns by the two groupings of organizations. The mean value for total IT operating spending for the non-acute group is \$4.2 million with a range of \$2.1 to \$7.8 million. For the acute group, the total IT operating averages to \$12.6 million with a range of \$5.6 to \$25 million. These figures show that the average total spending on IT for the acute organizations represented in our sample is higher than the non-acute group in absolute dollars. However, the mean values of the IT spend ratio (for example, without depreciation) are 3.7% for the non-acute group and 3.5% for the acute group.

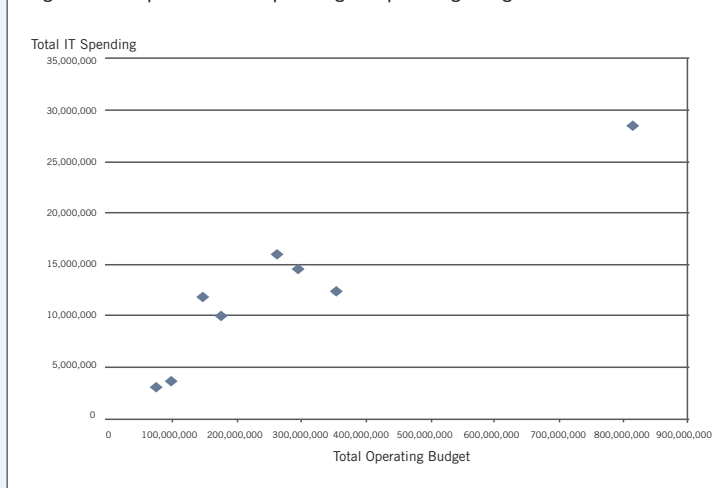
**Table 4. Cost Profile by Organizational Grouping (All Participants; n=8)**

Study Variable	Non-Acute (n=3)			Acute (n=5)		
	Mean	Median	Range	Mean	Median	Range
IT Spend Ratio <sup>1</sup> (w/o depreciation) (%)	3.7	3.0	2.6–5.3	3.5	3.2	2.8–4.7
IT Spend Ratio (with depreciation) (%)	5.3	4.2	3.7–8.1	4.8	5.0	3.5–6.1
Total IT Spend (\$M)	6.2	3.7	3.2–11.9	16.4	14.6	10.1–28.6
Total Operating IT Spend (\$M)	4.2	2.6	2.1–7.8	12.6	10.9	5.6–25.0
Total Capital IT Spend <sup>2</sup> (\$M)	2.0	1.1	0.9–4.1	3.6	3.7	2.5–4.6

1. IT spend ratio is the percentage of IT spending of total hospital operating spending.  
 2. The depreciation expense or capital spending calculated for this study reflects approximate values; for five organizations, capital spending was given for three years and for the other three organizations, a depreciation figure was provided.

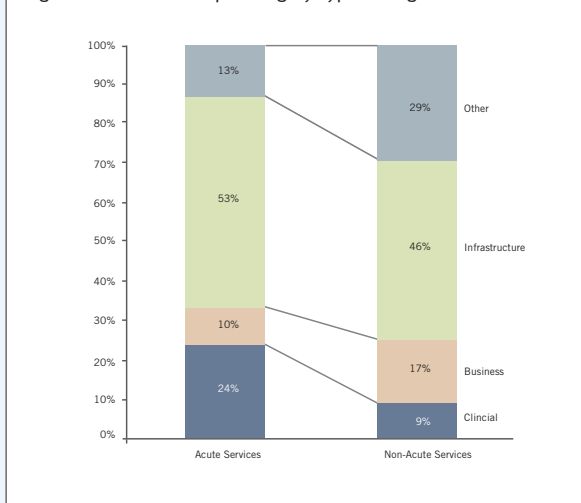
- The non-acute CIOs agree that their organizations have lagged in the sophistication and complexity of IT relative to the acute organizations. Over the past few years, these organizations have been attempting to “catch-up” and consequently, have experienced perhaps, higher than normal IT expenditures.
- Non-acute organizations, due to their relative small size, may not benefit from

**Figure 1: Comparison of IT Spending to Operating Budget**



the effects of economies of scale. One possible explanation for this behaviour is that all of the participants need to operate a minimum set of applications and systems to manage the core operations such as finance, patient registration, procurement and materials management, and human resources. With the non-acute organizations, these “fixed” IT costs are spread over a smaller total operating budget (the denominator of the IT spend ratio); hence, their IT costs are a larger proportion of their operating budget.

**Figure 2: Functional Spending by Type of Organization**



From these average IT spend ratios, it appears that non-acute organizations may spend proportionately more on IT than acute organizations represented in this sample. This IT spend ratio may be greater on average for the non-acute organizations for the following reasons:

Within the sample of five organizations completing the detailed cost template, most IT dollars support infrastructure (on average, 50% of total IT operating) and clinical (18%) functions. This distribution of IT dollars (or priorities) appears to change when this group is further divided into their acute and non-acute groupings (as shown in Figure 1). For acute organizations, their spending is concentrated within the infrastructure and clinical areas. For non-acute, there are some similarities in spending (e.g., infrastructure) to the acute group; however, there seems to be a shift towards less spending in the clinical category (only 9% of total operating IT) and greater spending to its business processes.

**Table 5. Descriptive Statistics – Template B (by Functional Category) (represented as % of total IT operating expenditures)**

Functional Cost Category	Mean	Median	Standard Deviation	Range
Clinical	18	13	13	7–39%
Business	12	10	9	5–27%
Infrastructure	50	47	9	42–64%
Other <sup>1</sup>	19	16	13	9–42%

1. “Other” spending includes primarily management and administrative-related IT spending.

The small number of organizations within each service grouping limits the applicability of statistical analyses and the interpretation of results derived in these analyses. However, its value has been in identifying potential cost differences between acute and non-acute organizations and in beginning to explore their management implications.

### KEY QUALITATIVE FINDINGS

The CIOs' feedback has been helpful in shedding some light on why there exists variability in IT costs among academic health science centres. When the CIOs were asked about the perceived challenges and problems encountered with this IT benchmarking experience, five broad themes emerged from their responses:

- *Data quality* – Among the CIOs, there were concerns about the consistency of data collection between organizations. Agreement on data definitions and the scope of the analysis was also raised as key issues in this exercise.
- *Approach/methodology* – Some CIOs felt that this exercise also was unable to describe the full impact or effect of IT spending on either quality of care or level of service.
- *Value* – The third topic to emerge from their feedback was the notion of “value” from this experience. A few respondents perceived that not all the participants appreciated nor understood the value of the approach taken in terms of its fairness, ownership of the process and “buy in” to the general principles of the methodology. Among the participants, some strongly believe that this initiative is an important and critical step in assuming a leadership role in IT performance research and noted that more information on the management of IT resources within academic health sciences centres will not only assist in initiating collaborative efforts but also provide more leverage in IT funding discussions with government.
- *Nature of care* – The fourth challenge identified is the perceived “type of care” difference between organizations and its implications on comparability (i.e., acute versus non-acute). Although comparisons are often made among academic health sciences/teaching centres nationally and provincially, there is some uncertainty about which organizations they can truly compare with.
- *Open disclosure* – The lack of open disclosure and “trust” among participants was also raised as an issue. Some participants believed that individual agendas or undisclosed reasons in pursuing this exercise were present. This may have resulted in little interest in pursuing a detailed investigation of cost differences.

The CIOs were in unanimous agreement that problems would be encountered in normalizing data across the

organizations. They identified four key “problem” areas:

- *Level of analysis* – To achieve a normalized cost comparison, it was indicated that a consistent, granular level of analysis is necessary. In this situation, there is a lack of a cohesive approach to measurement and in the aggregation of IT costs (e.g., use of two separate cost templates).
- *Accounting and management practices* – The accounting practices of capital expenditures (e.g., depreciation rates applied, expensed versus capitalized) differ across these organizations. These differences may depict an erroneous picture of IT capital spending and can lead to inappropriate comparisons of total IT expenditures.
- *Nature/focus of care* – Because of the differences in focus of care or care provision among the academic health sciences centres, it is believed that IT resource requirements are different and also, that they may be managed differently. For this reason, it may be difficult to compare the data in any consistent manner that could explain actual investment differences.
- *Consensus* – Reaching a consensus on the resolution of data normalizing concerns was problematic. During the study, diverging opinions surfaced on how to resolve these issues and agreement was, at times, difficult to achieve (e.g., determining IT support for research areas, inclusion or exclusion of IT-related depreciation).

### CONCLUDING REMARKS

This benchmarking exercise has uncovered four interesting findings and valuable insights into the complexities in measuring IT spending within the academic health sciences setting.

#### 1. *Contributing Factors to IT Cost Variability*

Why do IT costs differ by organization? What are some of the factors driving variability in IT costs? One possible explanation is a difference in allocation policy (or accounting) of IT costs within each organization. Further, costs may vary because of different IT resource management decisions and strategies exercised by these organizations. Other possible reasons are size differences as represented by their total hospital operating budgets and differences in their care or business focus (e.g., mental health versus rehabilitation).

#### 2. *Issues of Trust – CIOs' Perceptions*

The survey interview has been valuable in providing each CIO with a means of expressing their opinions. They expressed strong views on the following:

- value of benchmarking;
- data quality and comparability issues (see number 3 directly below);
- concerns about data uses: discomfort and uneasiness in participating in comparative analysis because of the

perceptions of “winners and losers” rather than viewing the exercise as a “building” and learning exercise and creating a culture of collaboration.

Trust among participants and in the release of their data emerged as a critical issue in this comparative analysis. From the interviews, some CIOs revealed that they had a sense that not all the participants understood the value and the benefits of this experience (e.g., participatory nature, ownership). Also, some believed that there existed “hidden” agendas and individual reasons for pursuing this process. They acknowledged that this lack of trust could inhibit the process, resulting in less confidence in the comparability of our results.

### 3. Critical Success Factors – Data Quality and Rigorous Methodologies

Data quality was a big concern, as illustrated by the CIOs’ repeated references to it. Extracting consistent data was difficult and complex because:

- it is extremely challenging to define a consistent set of definitions across multiple organizations;
- different accounting practices and cost structures exist across organizations;
- often IT costs are distributed throughout various functions in an organization (e.g., the degree to which IT is central versus distributed differs across participants);
- varying levels of commitment to “benchmarking” exist across and within participating organizations; and,
- limited resources available internally to dedicate to this type of initiative.

To achieve normalized datasets, the measurement approach must have clear definitions of the required data elements and a consistent data collection methodology. The CIOs all agreed that problems would arise in an attempt to normalize the cost data across the organizations and the use of two templates for gathering cost data would limit our ability to analyze, compare and interpret data. Yet, it was clear that several organizations would not participate without a dramatically simplified collection instrument.

The consequence of this decision was to place significant restrictions and limitations in the analysis and interpretation of results:

- only high level comparisons of IT spending could be made across all participating organizations (e.g., the IT spend ratio, total IT spending);
- even in these comparisons, capital expense had to be estimated in a normalized form to account for differences in reporting and data availability;
- detailed analysis could be completed only for a subset of the participants (e.g., the five organizations completing Template B); and,

- this further reduced the sample size (from eight to five organizations) raising the question of a representative sample.

### 4. Ongoing Measurement of IT Expenditure

With some basic understanding of IT spending levels and possible factors contributing to cost differences, the next steps are twofold:

- 1) to build upon the research process and repeat the study with a dataset representing more than one year’s data and with a broader set of participants, resulting in a statistically valid sample, which will permit more robust analysis to be conducted and conclusions to be drawn;
- 2) to supplement the investigation by focusing on how IT spending adds value within these organizations. This is necessary for two fundamental reasons: efforts to measure the value of IT within healthcare organizations is minimal; and, IT managers are increasingly put in a position to justify their spending on IT and to measure its precise impact on utilization and clinical outcomes.

One final point is that calculating a comparable total IT cost metric is not straightforward. It is hoped, however, that the methodology (and results) emerging from this study provide organizations with a strong framework and set of methods to enable future research initiatives aimed at broadening the understanding of IT spending and ultimately the relationship to improved health outcomes.

Appendixes online at <http://www.electronichealthcare.net/EH33/EH33Pederson.html>

For more information on the new IMPROVE-IT Institute, see [www.improve-it-institute.org](http://www.improve-it-institute.org).

### References

- Canada Health Infoway. 2002. *Infoway Pan-Canadian EHR Survey Phase I: Results and Analysis*.
- Canadian Institute for Health Information. *Health Care in Canada 2002*.
- Chan, Y.E. 2000. “Information Technology Value: The Great Divide Between Qualitative and Quantitative Measures and Individual and Organizational Measures.” *Journal of Management Information Systems* 16(4): 225–61.
- Commission on the Future of Health Care in Canada. 2002. *Building on Value: The Future of Health Care in Canada*.
- Dempsey, J., R. Dvorak, E. Holen, D. Mark and W.F. Meehan III. 1998. “A Hard and Soft Look at Information Technology Investments.” *The McKinsey Quarterly* 1: 127–37.
- Gartner Group. 2001. *Strategic Analysis Report: 2001 Information Technology Spending and Staffing Survey Results*.
- Hay Group. 1999. *Benchmarking Comparison of Canadian Hospitals – Teaching Hospitals*. (Toronto, Ontario).
- Helyar, C., J. Flett, M. Hundert, G. Fallon, G. Mosher and R. Crawford. 1998. “Benchmarking Comparisons

of the Efficiency and Quality of Care of Canadian Teaching Hospitals." *Hospital Quarterly*, 1 (3): 14-25.

KPMG 2001 White Paper. *Achieving Measurable Performance Improvement in a Changing World: The Search for New Insight*.

Leonard, K.J. 1998. "Investment in Information Technology: The Dilemma of Comparing Costs to Benefits." *Hospital Quarterly*, 1 (4): 53-56.

Leonard, K.J. 2004. "Critical Success Factors Relating to Healthcare's Adoption of New Technology: A Guide to

Increasing the Likelihood of Successful Implementation." *Healthcare Quarterly* 7(2): 72-81.

Pink, G.H., I. McKillop, E.G. Schraa, C. Preyra, C. Montgomery and R. Baker. 2001. "Creating a Balanced Scorecard for a Hospital System." *Journal of Healthcare Finance* 27(3): 1-20.

Willcocks, L. 1992. "Evaluating Information Technology Investments: Research Findings and Reappraisal." *Journal of Information Systems* 2: 243-68.

### About the Authors

**Lorraine Pederson** is a MSc student in the Department of Health Policy, Management and Evaluation, Faculty of Medicine, University of Toronto.

**Kevin Leonard** is an Associate professor in the Department of Health Policy, Management and Evaluation, Faculty of Medicine, University of Toronto. He can be reached at: k.leonard@utoronto.ca

Contact: Department of Health Policy, Management and Evaluation, Faculty of Medicine, University of Toronto, 12 Queens Park Crescent West, Toronto, Ontario M5S 1A8, CANADA

### Canadians Do Not Expect Much from New Accord

Almost 8 out of 10 Canadians are satisfied with the health accord reached by First Ministers in September. In a recent public opinion survey conducted by Environics Research, the accord was described as giving the provinces \$18 billion "in new healthcare funding over the next six years, within a framework of accountability on how this new money is spent by the provinces."

However, Canadians do not believe the accord will achieve a lot of progress in fixing the problems facing healthcare. Only 9% of respondents said they expect significant progress, almost as many expect no progress at all. Forty-six per cent of respondents anticipate some progress, and 34% expect only a little progress.

Almost 7 of 10 respondents disapproved of Quebec being exempted from some of the new requirements for reporting on the use of the new health funds.

(Source: *Health Edition Online*, Volume 8 Issue 41)

According to a new research report from FocalPoint Group, healthcare providers could spend more than \$7 billion on wireless technology and services by 2010. Key areas of application include patient monitoring, asset tracking and emergency response.

(Source: *Mobile Health Data*, September 9, 2004))

COURTYARD GROUP



[www.courtyard-group.com](http://www.courtyard-group.com)

New York ■ Toronto ■ Edmonton



► COMMENTARY

## Measuring IT Investments: A Non-trivial Exercise

DENIS PROTTI

In their paper, “Measuring Information Technology Investment among Canadian Academic Health Sciences Centres,” one gets the impression that Pederson and Leonard felt a need to share their frustrations. Not only was their task difficult (i.e., trying to get a meaningful grip on how much is being spent on information technology), but the lack of co-operation they encountered must indeed have been exasperating. Having also experienced the “reluctance-to-reveal” phenomenon, this commentator can sympathize with their trials and tribulations.

Determining the true cost of information technology (IT) across organizations is indeed a difficult task for a number of reasons. First, as Pederson and Leonard point out, there is little consistency across Canadian healthcare organizations as to what is to be included in the IT domain, let alone the information management (IM) domain. As part of a fourth-year course taught at the University of Victoria in 2004, 28 Chief Information Officers (CIOs) were interviewed by students and asked to describe the departments for which they were responsible. The survey found that the CIOs were heading divisions that had 17 different names, with information management leading the way – used in four sites. To say that our Canadian healthcare CIOs are responsible for a diverse set of departments is an understatement. Areas of responsibility range from the usual information management and technology (IM&T) to others such as networks, health records, decision support, telecommunications, biomedical engineering services, switchboard and information desk, library services and privacy. The areas for which the CIOs were responsible generated a list that was two pages long! Little wonder it is difficult to find a common set of measurements as to what the IT investment really is.

A second reason that it is challenging to measure the value of IT investments is because, as Pederson and Leonard point out, “Chief Information Officers (CIOs) and Chief Technology Officers (CTOs) find themselves under increasing pressure to defend the value proposition of IT.” A recent paper by Bend from the Institute of Public Policy Research in England, entitled, “Public Value and eHealth,” puts it even more bluntly: “Despite the clear potential, really solid evidence of a positive impact of IT in

practice is still quite scarce.” This is not a conducive climate for measuring and revealing one’s true costs.

The conundrum of measuring the IT function is that:

- efficiency (*doing things right*) is easier to measure than effectiveness (*doing the right things*)
- since effectiveness (*doing the right things*) and innovation (*doing new things*) cannot be readily quantified in terms of traditional outputs, improvements are not usually reflected in economic efficiency statistics
- new systems are intended to change difficult-to-measure actions
- strategic systems elude measurement
- infrastructure investments cannot be cost-justified on a Return On Investment (ROI) basis

As with any infrastructure, IT infrastructure does not provide direct business performance. Rather, it enables other systems that do yield business benefits. IT infrastructure is strikingly similar to other public infrastructure such as roads, hospitals, sewers, schools and so on. They are all long term and require large investments. They enable business activity by users that would otherwise not be economically feasible. They are difficult to cost-justify in advance as well as to show benefits in hindsight. They require a delicate investment balance: too little investment leads to duplication, incompatibility and suboptimal use; too much investment discourages user investment and involvement and may result in unused capacity.

IT in healthcare, that is, the electronic health record (EHR) journey, is very much about infrastructure.

### About the Author

Denis Protti is the founding Director of the University of Victoria’s School of Health Information Science. He can be reached at: [dprotti@uvic.ca](mailto:dprotti@uvic.ca)



Frank D. Scarpino  
President & C.E.O.  
[fscarpino@solutionalternatives.com](mailto:fscarpino@solutionalternatives.com)

e-Health Strategy and Consulting Services  
118 Queen Street W, Suite 201, Brampton, ON Canada L6X 1A5  
Tel: (905) 459-9832 Fax: (905) 459-9828 Cell (905) 302-3394  
[www.solutionalternatives.com](http://www.solutionalternatives.com)

**Survey Interview Tool**  
**Measurement of information technology performance among AHSC organizations:**  
**Survey of CIOs' perceptions of challenges and issues**  
**in conducting an IT benchmarking exercise**

INTERVIEW #: \_\_\_\_\_

DATE: \_\_\_\_\_

*Interviewer (read aloud)* In this survey interview, we are interested in gathering the feedback and opinions from you and other Chief Information Officers (CIOs) of Academic Health Sciences Centres on the process of benchmarking and its major challenges and issues. You will be asked questions related to the “demographics” of your organization, your current IT infrastructure, the general process of benchmarking and what this means and also, the challenges that we may face in undertaking this type of analysis.

**All information gathered from study participants will be treated as confidential.**

Interviewer: The purpose of this first section of the survey is to gather some basic information about your current management role within the organization and the organization itself.

<b>1.0 Organizational and respondent's demographics: (Background information)</b>	
1.1 What is your current title/role within the organization?	Please specify: _____
1.2 Which departments, functional areas and/or programs report to you?	Information systems and technology ..... 1 Tele-health ..... 2 Communications ..... 3 Library Services ..... 4 Clinical program(s): ..... 5 Other (please specify) _____
1.3 How long have you been working for this organization?	Less than six months ..... 1 6 to 12 months ..... 2 1 to 2 years ..... 3 3 to 4 years ..... 4 5 to 6 years ..... 5 Greater than 6 years ..... 6
1.4 How long have you worked in your current position?  <b>(Probe: Where this is applicable, what was your role in your previous position?)</b>	Less than six months ..... 1 6 to 12 months ..... 2 1 to 2 years ..... 3 3 to 4 years ..... 4 5 to 6 years ..... 5 Greater than 6 years ..... 6  Please specify if applicable: _____
1.5 What is the primary focus of care of your organization?	Adult, acute care ..... 1 Pediatrics, acute care ..... 2 Rehabilitation ..... 3 Geriatrics ..... 4 Mental Health ..... 5
1.6 How large is your organization? How many beds are available?	Less than 100 ..... 1 101-200 ..... 2 201-300 ..... 3 301-400 ..... 4 Greater than 400 ..... 5

How many full time equivalents?	Less than 200..... 1 201-400.....2 401-600.....3 601-800.....4 Greater than 800..... 5
How many annual discharges?	Less than 10,000 ..... 1 10,001-20,000 .....2 20,001-30,000 ..... 3 30,001-40,000 ..... 4 Greater than 40,000 ..... 5
1.7 How many physical sites are managed by your organization?	1 ..... 1 2 ..... 2 3 ..... 3 4 ..... 4 Greater than 4 ..... 5  Please specify: _____

<b>2.0 Information Technology (IT) Infrastructure</b>	
Interviewer: In this section of the survey, the questions pertain to the current IT infrastructure within your organization. In this particular section, we are once again asking for your opinion on the following questions.	
2.1 Including yourself, how many FTEs are currently working within the IS/IT department? <b>Note: Do not include FTEs working in other non-IT departments. Note this number separately.</b>	1-10..... 1 11-20 ..... 2 21-30 ..... 3 21-31 ..... 4 Greater than 50 ..... 5
Interviewer: This next question deals with the accessibility of computers.	
2.2 In your opinion, what percentage of employees have access to computers within your organization? <b>(Probe: Based on the responsibilities of staff, do you think that this is sufficient? Why or why not?)</b>	Less than 20%..... 1 21-40% ..... 2 41-60% ..... 3 61-80% ..... 4 Greater than 80% ..... 5
2.3 How many desktop computers or PCs do you currently have within your organization? (approximately)	Less than 100..... 1 101-200 ..... 2 201-300 ..... 3 301-400 ..... 4 401-500 ..... 5 Greater than 500 ..... 6
2.4 Also, how many workstations do you currently have within your organization?	Less than 100..... 1 101-200 ..... 2 201-300 ..... 3 301-400 ..... 4 401-500 ..... 5 Greater than 500 ..... 6

<p>This next question deals with the core IT processes that are currently functioning within your organization.</p> <p>2.5 How would you rate the following processes according to the extent to which they are automated within your organization? Where “1” reflects that the processes within the system are not automated and “10” indicates very high level of automation.</p> <p>Financial systems (Billing, G/L, Payroll)</p> <p>    Patient Care Systems</p> <p>    Laboratory</p> <p>    Diagnostic Imaging</p> <p>    Health Data/Patient Records</p> <p>    Pharmacy</p> <p>    Others: please specify</p> <p>    _____</p>	<p>1-----10</p> <p>Not at all      Somewhat      Very    N/A</p> <p>1 2 3 4 5 6 7 8 9 10</p> <p>1 2 3 4 5 6 7 8 9 10</p> <p>1 2 3 4 5 6 7 8 9 10</p> <p>1 2 3 4 5 6 7 8 9 10</p> <p>1 2 3 4 5 6 7 8 9 10</p> <p>1 2 3 4 5 6 7 8 9 10</p> <p>1 2 3 4 5 6 7 8 9 10</p>
<p>2.6 In your opinion, what is the main use of information technology within your organization? (<b>open-ended question</b>)</p> <p><b>(Probe: In other words, what is the purpose(s) of IT within the organization? Why is the organization using IT?)</b></p>	
<p>2.7 What trends do you foresee that may impact the functionality of information technology within your organization? And, within the healthcare system as a whole? (<b>open-ended question</b>)</p>	

<p>3.0 <b>Benchmarking: Application and challenges</b></p>	<p>Interviewer: In this section, we will be discussing the relevance and use of benchmarking.</p>
<p>3.1 <b>Benchmarking can be described as “a method of continuously comparing and measuring the work processes of an organization to gain information which will help to improve performance.”</b></p> <p>Is “benchmarking” used in your organization? If yes, can you describe how it is used? <b>(open-ended question)</b></p> <p><b>(Probe: Can you give me examples of benchmarking within your organization?)</b></p>	
<p>3.2 Broadly speaking, within the information technology sector, what are the major benefits of conducting this type of analysis? <b>(open-ended question)</b></p> <p><b>(Probe: What can we achieve? What information can we gather? In what ways, can this process of benchmarking help?)</b></p> <p><b>If the respondent does not believe there are any benefits, please ask why and record his/her reasons.</b></p>	
<p>3.3 In our particular benchmarking exercise, what challenges or issues do you perceive and why? <b>(open-ended question)</b></p>	
<p>3.4 Do you think that we will encounter problems in normalizing the data across the organizations? Why or why not?</p> <p><b>Please specify the problems or issues raised.</b></p> <p><b>(open-ended question)</b></p>	
<p>3.5 Once again, with respect to our benchmarking initiative, do you think that the “study” indicator will result in appropriate comparisons between the organizations? Why or why not? <b>(open-ended question)</b></p>	