



## Commentary

# Investment in Information Technology: The Dilemma of Comparing Costs to Benefits

By Kevin J. Leonard

**M**ost strategic investment decisions incorporate a business-case evaluation; all of the future benefits are weighed against current and future costs. The objective, of course, is to invest only in initiatives that have more benefits than costs; and so their accurate evaluation is very important. Otherwise the decisions that result may be less than optimal.

Business cases for new technology or new information systems (IS) are no different. Although the cost components of technology, such as hardware and programming are usually straightforward, the benefits are very difficult to measure (Laudon and Laudon 1996). How do you put a price tag on the “ability of someone to do their job better”; or how do you calculate “people enjoying their jobs more and, consequently, being more effective”? This article discusses the dilemma of evaluating the benefits of information and information systems in an attempt to support in the development of new and effective IS in healthcare.

### EVALUATING THE COSTS

The first question that must be addressed is the timing of the incurred costs and benefits: “Is it worthwhile to create these new Information Systems?” In other words, do the benefits outweigh the costs? Often the benefits are very difficult to evaluate and, as a result, many initiatives have begun with little knowledge of their magnitude or the timing of their arrival. On the other hand, many initiatives are defeated before they begin because the expectations have not been properly assessed and the time commitment has not been appreciated.

The costs associated with Information Systems typically include:

- explicit supplier costs associated with hardware and software;
- service contracts with external suppliers;

- allocation of personnel salaries during design and development;
- travel costs (for both internal and external personnel);
- implementation costs and pilot-testing (i.e., overtime, perhaps running two systems in parallel);
- long-term management and maintenance costs – internal and external; and
- calculation of opportunity costs (including cost of capital).

Perhaps the one cost most often overlooked is “opportunity cost.” Money invested in long-term projects – such as the development of information systems – is consequently not available to invest in other initiatives. These other initiatives have a potential inherent return on investment (ROI) associated with them. To estimate total true costs, an estimate of this ROI must also be incorporated in the calculations.

### ... AND THE BENEFITS

The benefits from IT investments are harder to identify. Below we provide three categories. Within each, we offer examples. A complete listing is not possible, as the items will vary according to the specific organization or departments involved.

#### COST REDUCTION

Reduction in personnel (i.e., downsizing) is often the most obvious benefit and the one that is most often cited – sometimes to the exclusion of all others. As an example, efficiency gains from a new system may allow for a staff reduction of three. If these are eliminated, each with an estimated annual cost of, say, \$50,000, the cost savings are \$150,000 per year. If the project is evaluated over a four-year time frame (owing to the amortization schedule associated with the project), the savings could be further refined based on their present value.

**COST AVOIDANCE**

Another benefit can best be described as cost avoidance. Consider the case where expansion of an organization is forcing the need for a new site or building. If IT can streamline processes enough, the new site may not be needed. This cost saving, or avoidance, must be included in the business case being considered. To overlook this component would unjustly bias the calculations in the direction of costs and an unjust consideration of benefits.

**PERFORMANCE IMPROVEMENT**

A important category of cost savings and benefits falls under the general heading of performance improvement. This requires the measurement of current practices and future performances; the difference constituting the improvement or decline. The measurement of current practices, however, assumes standards and measures. If these do not exist, comparison across institutions or time make no sense because the units of measure may vary. Listed below are samples of typical measures that could be used:

- Reduction in time to get the job done (i.e., cycle time)
- Increase in percentage of tasks with no errors (improvement of quality)
- Increase in staff satisfaction
- Increase in patient satisfaction
- Reduction in re-admissions
- Reduction in length of stay
- Reduction in adverse events
- Improvement in Balanced Scorecard performance

Inherent in the development of these benchmarks is agreement on standards of data capture and quantitative analysis. However, standards and measures in healthcare are scarce because of poor information systems. Consequently, “performance improvement” is a difficult component to integrate into the calculation of benefits. Consider, for example, the treatment of asthma cases in the emergency room. This single example comprises multiple components of treatment that could all be analyzed under the measure of cycle time: time waiting before seeing a clinician; time with a physician or other clinician; time doing the diagnostic tests; and treatment time (incorporating both treatment in the ER and the training required to perform follow-up treatment in the home). It becomes readily apparent that to calculate the benefits of IT in treating asthma requires established standards of time calculation, methods of data capture and a system by which current measures could be generated and compared to historic values (or other benchmarks). Finally, a method for assigning a dollar value to the improvements is required if benefits are ultimately to be compared with costs.

Categorizing the basic task elements and assigning dollar values would need to take place for all the measures on the above list. A fact best summarized by the last item on the list –

improvement in Balanced Scorecard performance. The concept of the Balanced Scorecard recognizes that an organization delivering healthcare cannot make and measure improvements in isolation; if an organization concentrates on one measure to the exclusion of all others, then the overall performance of the organization would be poor. Perhaps overall combined benefits should be based on a dollar-value relationship which reflects the Balanced Scorecard and the improvement or decline over time.

**INFORMATION SYSTEMS ARE NEEDED TO ILLUSTRATE THE BENEFITS OF INFORMATION SYSTEMS**

In the healthcare industry, the main premise of improved information systems is that they will help to increase productivity, effectiveness and efficiency. A large expenditure on IS has to demonstrate that benefits outweigh costs. However, an information system is required, using standards and measures, to illustrate the improvements that can be gained.

The only way out of this endless loop is to begin the process somewhere. Maybe the best place to begin is by identifying certain standards and measures – such as those in a Balanced Scorecard. Benchmarking in healthcare (through the use of Balanced Scorecard components) is currently fraught with difficulties because of the diverse data-capture techniques and the various data-coding options. That too needs to be overcome. For instance, in a recent study, a medical imaging (MI) department was evaluated in three comparable areas: Ultrasound, CT Scan and MRI. The objective was to reduce performance ambiguities. However, when performance across MI areas and across hospitals was compared, it was apparent that no standards exist in performance measurement, and the project was terminated. For the most part, hospitals operate without clear guidelines. Until such guidelines are developed, meaningful comparisons cannot be performed, and determination of the optimal process cannot be attained.

Consequently, a pursuit of standardization is imperative if we are to invest in IT heavily and adopt IT effectively. An industry-wide goal of pursuing common standards would encourage the development of a forum to structure reasonable standards, benchmarks and objectives. But we need the IS first to demonstrate that it is cost-effective to do so. The recommendation, then, is that research must begin to apply the business-case methodology to IS needs in healthcare.

**CONCLUDING REMARKS**

It is difficult to change something that you do not manage; to manage something you do not measure; to measure something you do not see. However, change is imperative and with proper information systems and benchmarks it is possible. Benchmarking would enhance the change process because, by creating standards, additional health providers would reduce

performance anomalies. Clearly, improvements in efficiency will lead directly to lower costs. As appropriate information and feedback are necessary conditions for improving efficiency, identifying standards for performance measurement is critical.

In the short term, areas where IT has already been implemented (either within an organization or within the healthcare industry) must be studied to see the scope of improvement that is attainable through technology and to attempt to quantify that improvement. A second approach is to start pilot projects in specific areas (such as radiology) and so create the structure to make analysis meaningful. The move to improvement of IS effectiveness is not a discrete event but rather a continuous process.

A case study from Sunnybrook Health Science Centre follows. It is difficult to know with certainty that their IT project would have been approved without the needs established by a costly Year 2000 initiative. Hopefully, we will not depend much longer on using the Y2K problem as a major source of cost avoidance. Yet, if nothing else, this case reinforces the need to provide better estimates of benefits from efficiencies in order to evaluate IT on its actual merits and outcomes. **K**



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*Readers are invited to contact Dr. Leonard (k.leonard@utoronto.ca) to discuss his recommendations and to obtain a valuable reference list for further study.*

**REFERENCE**

Laudon, K.C. and J.P. Laudon. 1996. *Management Information Systems: Organization and Technology*. Fourth edition. New Jersey: Prentice Hall.

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Hospital Quarterly is considered more valuable to our readers in their role as health care administrators than all other journals listed.<sup>2</sup>

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We know how respondents rated the importance of issues<sup>3</sup> and the editors will respond. The number one issue in the minds of our readers is "Integrated Healthcare."

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- 1 These comments reflect a trial survey mailed to healthcare providers across the country in May. Although the data provide some interesting insights, the numbers should not be considered statistically significant. The survey also included a number of confidential questions related to special projects underway by clients.
- 2 Business Quarterly (Ivey), Canadian Healthcare Manager, Healthcare Management Forum, Canadian Healthcare Technology, Group Healthcare, Hospital Quarterly, Harvard Business Review and The Economist.
- 3 We asked readers to rate the importance of covering some 17 issues.

