Prescriptions for Investment in Health Information: Managing Risk for Maximum Benefit

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ABSTRACT
As we plan to increase our spending on health information technology in Canada, this article cautions that we must manage risk carefully and get the most out of our investments. The author outlines 13 principles for investments in information infrastructure that were derived from observations of successes and failures in health and other industries.These principles are: be certain funding is adequate; communicate project objectives in clinical or business terms; actively manage stakeholder expectations; where possible, fund results, not technology; learn from the successes and failures of others; plan for failure; put users in the driver's seat; invest in success; build teams with experience; maintain strong communication links with stakeholders; include process design in every project; keep projects short; and avoid creating political footballs.

Canada is on the verge of escalating its investments in health information systems. Spending by hospitals, health regions, governments and the private sector on health information is expected to double in the next five years. As we contemplate this increase in resources, it is essential that we look at the successes and failures of the past to inform our decisions about how best to allocate the funds.

Investing in information technology is about inventing the future. As we can never fully predict the impact of introducing new technology, investments in information technology (IT) involve significant risk. No matter how diligent we are in planning IT projects today, some of our new initiatives will fail. Fortunately, lessons learned from other industries, from other countries and from previously attempted projects in Canadian healthcare can help to minimize the

risk of failure in the future. A well-planned and well-thought-out project that fails is an opportunity for learning. A project that fails by repeating past mistakes is a waste of resources. It is this latter group we must seek to avoid.

This paper suggests a series of principles for investments in information infrastructure that are derived from observations of successes and failures in health and other industries. Although not an exhaustive list, it is a prescription for maximizing the return on investment in IT for healthcare.

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1. BE CERTAIN FUNDING IS ADEQUATE

Frequently, IT projects fail due to inadequate funding. IT projects continue to be funded as if they were a one-time capital expenditure, which is *never* the case. Hardware must be replaced at regular intervals, software needs maintenance and upgrading, and users require ongoing training and support. Projects funded on a one-time basis get off to a promising start and then often languish due to inadequate funding. Users turn against projects when support is inadequate or the functionality does not meet their needs. The failure of these projects is often blamed on the resulting lack of support from users and the root cause — inadequate funding — is often not identified.

With very few exceptions, IT projects should always be funded on the basis of an annual budget. Allocations for hardware and software should be adequate to cover operating leases with terms of no more than five years for software and four years for hardware. Additional funds for project staff should be included to cover implementation, support and training requirements. The implementation process should not be viewed as a one-time effort but as an iterative, evolutionary process of improving information management over time. With each new system introduced, there are opportunities to improve processes, functionality, efficiency and quality that take many years of concerted effort. During the years after the initial implementation, the benefits of information systems are achieved. Too often project resources dwindle before a return on investment is realized.

2. COMMUNICATE PROJECT OBJECTIVES IN CLINICAL OR BUSINESS TERMS

Modern society has become so enamored with the benefits of technology that there is a tendency to have a blind faith in automation for its own sake. We frequently see projects focused on automating components of the healthcare system such as electronic patient records, order communications or automated purchase requisitions. Without explicitly defining the improvements in care delivery processes sought through automation, it is likely that these improvement opportunities will be missed and value for money invested in technology will remain elusive. Too many IT projects define objectives in technology terms rather than clinical terms relevant to patient care.

If goals for information projects are clearly spelled out in clinical or business process improvement terms, the project team remains focused on delivering value and a ready indicator of implementation success is available. Table 1 includes examples of clinical or business objectives and the corresponding automation objective.

Note that it is possible to achieve the automation objectives listed above *without* achieving the corresponding clinical or business objectives. The need for process reengineering to achieve clinical or business objectives is addressed later in this paper.

It is very tempting to start automation efforts with the installation of basic IT infrastructure such as PC networks, messaging systems, data warehouses and other technology. This type of infrastructure project is rarely advisable on its own. One might call this approach the "if we build it, they will come" strategy. I would argue that infrastructure should be installed only in the context of meeting the minimum requirements of applications designed to achieve clinical or operational improvements as outlined above. The reasons for this assertion include:

- The cost of technology infrastructure drops

TABLE 1: Examples of Clinical or Business Objectives and Corresponding Automation Objectives

CLINICAL OR BUSINESS OBJECTIVE	AUTOMATION OBJECTIVE
• Reduce diagnostic test ordering (due to repeat testing when data is not available) • Reduce patient waiting times (due to waiting for results in the clinic) • Reduce spending in health records (due to fewer chart requests)	• Deliver information to the right people, at the right time and in the right place
• Reduce the amount of time it takes a cardiologist to interpret and report on a study • Make old ECGs available in emergency within 60 seconds • Eliminate storage of paper ECGs in the paper chart (reducing storage costs)	• Online ECG system
• Reduce in-house inventory by 20% • Reduce list of suppliers by 25% • Decrease average delivery time by 1 day	• Electronic purchase requisitions

by half every one to two years. Hence, any capacity installed in excess of immediate needs has been installed at excessive cost.

- Technology changes so quickly, it is difficult to predict requirements in the future. Hence, minimum necessary implementations today lead to a minimum of obsolete technology tomorrow.
- Resources focused on infrastructure installation distract attention from addressing opportunities for implementing projects that would result in immediate clinical or business improvements. This contributes to significant cynicism in the user community that sees large sums of money being spent on computer infrastructure with no impact on immediate clinical needs. This erodes support for continued investment in information technology.

3. ACTIVELY MANAGE STAKEHOLDER EXPECTATIONS

In an effort to garner the support of stakeholder groups, sponsors of information projects often outline a very exciting vision of the future. This often sets expectations in the minds of stakeholders that are impossible to meet, thus dooming the project before it starts. Excessive expectations fall into two categories. The first relates to the timeline for expected functionality to be available. Health information projects often take five to ten years to fully mature. Users expect mature functionality in a fraction of that time. The second false expectation is that new systems and new functionality will result in early benefits with little required effort. In reality, the implementation of any information system is extremely disruptive to operations and often requires large investments of time and energy on the part of users to modify operational practises. Users need to know that things will get worse before they get better. This is often not incorporated in the utopian vision of a technology-driven future sold to users to obtain their support.

If stakeholder groups are realistically prepared for the challenges of implementing new technology and clearly understand the benefits on a clinical or business basis that justifies the effort, they are much more likely to support the project through its difficult initial phases. This is fundamental to good change-management practice.

4. WHERE POSSIBLE, FUND RESULTS, NOT TECHNOLOGY

A significant proportion of technology projects will fail during the implementation process for a wide variety of reasons. This is especially true of projects that are attempting to break new ground. Any IT infrastructure investment involves significant risk.

In situations where there are a variety of technology solutions available, the most appropriate technology solution may not be obvious. It is difficult to bet on a particular technology

when it may be eclipsed by another competing approach in the future. Rather than taking on this risk, a government or region could choose to fund transactions that meet certain criteria rather than funding the installation of a particular system.

An example of this might be the implementation of a picture archiving and communication system for medical imaging. There is a plethora of vendors competing in this marketplace that will lead to significant consolidation to a smaller number of vendors over the next few years. Choosing which of these vendors is likely to be successful is an impossible challenge. A number of factors in addition to cost and functionality will determine ultimate market success. If a government wanted to fund this type of project, it could pay for image handling transactions that meet certain criteria. These criteria could be designed to ensure that the clinical and operational goals of the initiative are met. Hence the government would take on a certification and funding role rather than a project management and implementation role. With a revenue source identified to establish a business case, it is likely that private capital will pursue the newly created market opportunity. Only image handling systems that were successfully implemented and met clinical needs would receive funding. Failed projects would receive no government money, ensuring that tax dollars are not used to fund white elephants. Selection of system functionality would be squarely in the hands of the user community where it belongs. This model would establish ongoing funding even before the technical infrastructure is installed. It also ensures that local differences in user needs are incorporated into system specifications.

Despite the obvious advantages of this model, we have not seen this approach used very often in Canadian healthcare. It suggests that ministries of health are more comfortable in project management and implementation roles for IT projects than in program funding and policy roles. This might reflect our tendency to hire technology experts to manage information projects rather than managers with clinical, business and policy expertise.

5. LEARN FROM THE SUCCESSES AND FAILURES OF OTHERS

Although it seems obvious that one would learn from the experiences of others, the degree to which this does not occur in the health information community is shocking. A number of factors contribute significant obstacles to learning from the experiences of others, including:

- A lack of objective evaluation criteria to access information projects.
- A much stronger tendency to publish successes rather than failures.
- The difficulty of distinguishing mere plans from completed implementations in published material.
- A lack of peer-reviewed published material in healthcare IT literature.
- A tendency for site visits to involve technology managers rather than frontline users.
- The unavailability of good cost information about system implementations, making budget comparisons very difficult.
- A strong tendency to blame individuals or circumstances for system failures rather than performing careful postmortem audits.

Until these issues are adequately addressed, our ability to learn from each other will be limited. Resources allocated to improving our industry knowledge base will lead to better return on investments in the future.

There is also a strong tendency in the industry toward fads. We tend to emulate the plans and approaches of others even though they remain unproven. This groupthink tends to stifle innovation and can lead to premature abandonment of promising approaches that might take many years to bear fruit.

6. PLAN FOR FAILURE

It is inevitable that a number of information initiatives will fail despite best efforts at managing risk. The potential impact of these failures can be mitigated through a diversification strategy. If a series of adequately resourced and well-planned projects are pursued in parallel, one can hope for perhaps a seven out of ten success rate. This prevents the scenario where all the eggs are in one failing project basket, which

drags the entire organization down with it.

This approach will work to reduce risk only if the projects are adequately resourced and well planned. If project resources are stretched across too many simultaneous initiatives, the benefits of diversification are countered by the increased risk of a failed implementation from inadequate support.

7. PUT USERS IN THE DRIVER'S SEAT

It is not enough to simply involve users in a project. They must have control of some aspects of the project and have responsibility for its successful implementation. The larger the scale of any particular project, the more difficult it is to achieve this in a realistic way. Representative groups of users enlisted for purposes of developing specifications are insufficient to guarantee user buy-in. This is especially true in large government-funded projects that involve large numbers of users. The assumption that a single solution will meet needs across a broad spectrum of users (the one size fits all assumption) is especially dangerous. The physician user community is notorious for not behaving as a homogeneous group. Implementation approaches must be designed to accommodate diverse and difficult to define user requirements.

Turning user needs into a system specification is not a one-step process. This is especially true in the case of new systems being introduced into a clinical environment. Users may not have encountered similar functionality in the past, so it is not until they get exposure to the first version of a product that they will provide effective feedback for specification development. Hence, system specification and development is an interactive process. This is difficult to accomplish in any model that does not involve local decision-making and governance. Proven functionality can be attempted on a large scale, but unproven functionality should be executed only at a local level. Large regional and provincial projects often break this rule with predictably poor results.

Several strategies can be used to engender strong user commitment to a project, including:

- Giving local user groups control over project funding.
- Using multiple, small pilots to avoid costly, large-scale failures.
- Funding transactions to ensure that users actively use the system.
- Developing specifications using an interactive approach to respond to user needs.
- Defining project objectives in clinical or business terms relevant to the user groups involved.
- Keeping the lag between product specification and implementation short, ideally less than 18 months.
- Compensating users for time spent in training or specification development.

8. INVEST IN SUCCESS

There are a number of very successful health information systems implementations across the country. Some of these are in regions or individual hospitals, while others span entire provinces. These installations offer an excellent base for extending functionality both in depth (adding further functionality) and in breadth (extending existing functionality to other user communities). These installations represent successful combinations of technology, user commitment, experienced IT management, focus on operational imperatives, good design, etc. They have built successful project teams and user coalitions to successfully implement functionality.

The majority of new information technology investment should be placed with these successful groups to extend the breadth and depth of functionality across the industry. They represent much lower-risk investments than unproven new groups that have good intentions but don't have the experience of more established teams. This funding approach will prevent retracing the learning curve as we look to establish similar functionality in health constituencies across the country.

Funding for IT projects should emulate a venture capital model. Seed funding should be provided to a large number of initiatives. Only those that show results should receive further funding. Poor performers should be shut down. As new ventures grow, subsequent allocations of funding get larger with each new round.

These ideas run counter to a troubling but insidiously powerful force in Canadian public sector healthcare funding: the principle of fairness and equity that provides all stakeholders with equal access to funds. Ideally, information technology investments should be based on clear, objective criteria. By definition, this means investing in success and putting more money into areas of strength rather than shoring up the weak. New investment should encourage stakeholders with poor information infrastructures to partner with their more advanced counterparts. This will maximize the return on our limited IT investments.

9. BUILD TEAMS WITH EXPERIENCE

Many projects fail due to an inexperienced implementation team. Many well-conceived and well-funded projects founder due to poor management decisions during the planning and implementation phases. This is occurring with increasing frequency as investment in health IT increases faster than the supply of experienced health informatics professionals.

This shortage of experienced, well-trained health informatics leadership is playing out across Canada as a number of high profile chief information officer (CIO) searches are having difficulty recruiting suitable candidates. This same phenomenon is occurring at all levels of the informatics team, from analysts and project managers up to the CIO level. Universities require significant increases in funding to expand available programs to address this shortage. Employers can support future supply by hiring students for co-op work terms and supporting staff members that want to enhance their education while on the job. All of us will have to shoulder some of the burden of educating the health informatics leaders of tomorrow.

Meanwhile, we still have to address the problem of staffing current projects. The challenge of implementing a significant health information system is the wide variety of skills required for success. The skills and experience of the team must include knowledge of health, technology, operations management, change management and organizational behaviour. Ideally, the team would be led by someone with a demonstrated track record of success in implementing technology in a health setting. With experienced leadership, one can get away with relative inexperience on the project team. Without experienced direction, the team is destined to repeat the mistakes of others, substantially increasing the risk of failure.

10. MAINTAIN STRONG COMMUNICATION LINKS WITH STAKEHOLDERS

Every project manager knows that frequent and open communications with stakeholders is essential for a successful implementation. Although this is accepted wisdom in most quarters, some provincially managed projects break this rule routinely. It is not surprising that so many of these initiatives suffer from poor support from stakeholders.

In order to avoid political controversy, some provincial governments insist that all communications about health informatics projects be vetted through the same office that reviews press releases and policy statements. As a result, these projects release very little information to stakeholder groups and the information that does go out is so sanitized it is of no use. Managing user expectations is impossible in this scenario leading to misinformation, rumours and inflated user expectations that inevitably will be disappointed.

Although political sensitivity about these high-profile projects is understandable, it must be recognized that without a high degree of transparency, these projects are likely to fail. Somehow the structure of these projects must isolate governments from political fallout as a result of routine communications about the status of an implementation. If this cannot be done, it is probably better that the projects not be undertaken in the first place.

11. INCLUDE PROCESS DESIGN IN EVERY PROJECT

If the introduction of new technology is to have clinical or business relevance, some aspect of operational process must change. Hence, every project team should include some process redesign capability. The degree to which this is overlooked is startling. The origins of this

oversight are deeply embedded in the professional culture of healthcare. The tradition of independent, self-regulating professions emphasizes an encounter driven model of care delivery. All clinical professions espouse a care model that is based on an "assess — diagnose — treat" paradigm that pays minimal attention to the process of care delivery.

This results in a tendency to espouse an "install — educate" model of systems implementation. That is, if each clinical professional is trained in how to use the new technology, they will use the systems advantageously to improve care. This ignores the substantial opportunity for workflow redesign to improve care delivery outcomes. Indeed, if we are restricted to implementing systems that support current care delivery models, we will miss the largest opportunities for improving care through the introduction of new technology.

12. KEEP PROJECTS SHORT

Longer implementations have an inherently higher risk of failure. As the duration of a project increases, a series of forces begin to work against success. The phenomena that increase risk include:

- The likelihood that key individuals will leave their jobs increases. This includes project implementation staff, key management sponsors, vendor staff and supportive leadership from stakeholder groups. This discontinuity in the players erodes support for the project.
- Technology changes quickly. The technology on which any implementation is based becomes obsolete with the passage of time. The risk of obsolescence increases with the length of the project.
- Users withdraw support when results are not apparent in a timely way. Once a user group is engaged in a project process, they expect some tangible progress within a reasonable time frame.
- Business priorities change. Most IT projects are funded to address a perceived need or to solve a problem. Perceptions of the priority of particular initiatives change over time. If a project takes too long to achieve results, sponsorship support might disappear due to the emergence of other, more important priorities. Often, this leads to reallocation of resources and the resulting risk of project failure.

In order to avoid these pitfalls, health IT projects should be limited to no more than 18 months. If a proposed project cannot be achieved in that timeframe, it should be reduced in scope or broken into a series of smaller phases that can be achieved in that time. Note that each phase must offer clinically relevant benefits to users for this approach to work.

13. AVOID CREATING POLITICAL FOOTBALLS

Many technology projects fail due to political opposition to the changes they introduce. Although a technology initiative might improve patient care, some groups may oppose it if professional roles and responsibilities change, systems threaten professional autonomy, financial resources shift between stakeholders or political influence is affected. In general, a larger magnitude of change resulting from new technology results in a higher risk of implementation failure.

Projects that promise fundamental changes in the way care is delivered should be kept small and local to users that support the change. Their sponsors should also be local to avoid attracting broad, political attention. If these projects demonstrate the expected results, they can be funded to expand to include a broader user community. If this is not done, the objectives are likely to be changed to reflect the status quo. Political discourse tends to entrench current practice rather than promote change. Smaller projects sow the seeds of change more effectively as they can fly under the radar screen long enough to establish themselves before being subjected to wider scrutiny.

IN SUMMARY

Managing investments in IT is akin to managing an investment portfolio. Maximizing the return on investment is all about optimizing the risk-return profile. A well-balanced portfolio includes a diversified array of investments, some high-risk new ventures, and some fixed income instruments with guaranteed returns.

As we plan to increase our spending on health IT in Canada, let's manage risk carefully to get the most out of our investments. I hope these suggestions help to achieve this objective. Our future health depends on it. e