



CAPAM Conference Public Service Excellence: Embracing Innovation and Change

Realizing the Promise of Technology

Encouraging and Managing Innovation: The Example of Metro Vancouver, Canada

Introduction

Innovation is viewed as a virtual synonym for progress. New ideas are required to solve existing problems and discover and capitalize upon new opportunities. Yet the idea of an 'innovative public service organization' is often seen as being an oxymoron. The sub-theme of this conference session suggests "there is trepidation and reluctance to adopt new technologies" because of the high failure rate. It is often suggested that only in the private sector does the risk/reward equation take on a form which allows innovation to occur. Hence one of the drivers for 'public private partnerships' is the transfer of risk from the risk-averse public sector to the risk-tolerant private sector.

This paper discusses the recent experience of Metro Vancouver, particularly in the area of major public utilities, in the hope of shedding a different light on how innovation can be encouraged and managed in the public sector and to give examples of this from Metro Vancouver.

Metro Vancouver

'Metro Vancouver' is the popular name for a complex governance institution which provides a variety of services to the twenty-two local municipalities, one First Nation local authority and the remaining unincorporated areas, which together make up the metropolitan area of Greater Vancouver, with a population now around two and a quarter million people.

It began about ninety years ago when separate local governments in the area began to encounter increasing difficulties providing their own drinking water and dealing with sewage. They concluded that a collaborative approach to providing these services would be more efficient and effective and eventually the Greater Vancouver Water District and Greater Vancouver Sewerage and Drainage District were created to provide these services on a regional scale.

Over time, other services have been added, but drinking water, liquid waste management and solid waste management still dominate the half billion dollar budget and will be the focus of this paper.

Relating Innovation to Goals: the Challenge of the Nature of Utilities

Before tackling 'trepidation and reluctance', we have to first ask what our overarching goals are and how does innovation serve the achievement of those goals. The goals of efficiency and cost-effectiveness dominate management manuals. Later other goals connected to sustainability will be discussed. But if we consider the innovation challenges facing major utilities, two deeper and over-riding goals will soon be revealed.

The first and obvious challenge is the dire consequences of significant failure. The public health consequences of failures in water treatment are so potentially profound that the names “Milwaukee” and “Walkerton”, where such failures occurred, likely lurk deep in the unconscious nightmares of every water utility operator in North America. The environmental consequences of failures in wastewater systems can bring both legal and reputational consequences. For these, there is usually no meaningful risk/reward equation. Running out of water, compromised public health through contamination of the water supply, massive environmental damage through wastewater treatment plant breakdowns are risks the public will not tolerate and this applies whether or not the service is provided by the public or private sector. In fact, the possibility that private sector companies might be more prepared to take such risks has been cited in arguments against privatizing water utilities in Vancouver and elsewhere. Fair or not, this underscores the zero risk expectations around essential public utilities.

The second challenge is the critical importance of and the continuous nature of the utility functions. There is no time when the demand for water disappears, when the flow of sewage stops, when the trucks full of garbage cease to arrive. So ‘trying one thing and if it does not work try another’ is not a strategy available at a scale of operation where redundancy is impossible. As Metro Vancouver recently discovered in a major power failure, you cannot fully test the assumptions about contingency plans without shutting down the plant; something we would never deliberately do.

The basic goals of the protection of human and environmental health and the maintaining continuous reliable service thus trump all other considerations and dictate a zero risk operating philosophy, often reinforced by an inability for ‘trial and error’ testing of options.

In Metro Vancouver, as public sector facilities, these utilities receive closer public and media scrutiny, which may add to the risk averse philosophy. But if so, that may not be inappropriate. The Metro Vancouver public is no more willing to pay taxes than any other community, but has repeatedly demonstrated that the basic public health/environment/reliability goals far outweigh cost considerations.

Management Challenges which may inhibit Innovation

Historically Metro Vancouver functions were added incrementally and tended to form different departments. These solidified into distinct silos which significantly narrowed the range of innovation possible, particularly when much innovation stems from initiatives that cross disciplinary, let alone administrative, boundaries. Addressing this problem required major restructuring.

Also, Metro Vancouver, like many similar organizations, has a very structured hierarchical decision making structure. Senior management is ultimately held accountable by the Board of Directors and is therefore wary of delegating to less experienced staff final decision making power on issues which may turn out to have significant financial or political consequences. The structure is designed to ensure mature consideration of major decisions and in itself should not militate against innovation. But it may, if the process is not right.

As an example, one strategy pursued at Metro Vancouver was to gather together some of the brightest talent from the professional and middle management ranks and task them with identifying and pursuing innovative opportunities across the organization. This group of highly talented professionals soon generated considerable enthusiasm both for their task and for some of the specific projects they had identified. However, decision making authority for such projects remained, as for the most part it must, with the departmental senior management. The latter weighed these innovation proposals against other priorities in the context of limited financial and staff resources. This 'balanced' approach had a somewhat dampening effect on the innovative spirit particularly as, at that time, the evaluation system for capital projects was entirely based on reducing risk, following the philosophy described above. Projects which did not address a known risk but instead pursued the achievement of some new benefit were labelled 'opportunity projects' and even when treated as 'special cases' rarely were given priority. From this we learned separating the search for innovation from the final decision making process was counterproductive. They had to be integrated.

It would not be accurate to characterize the Metro Vancouver corporate culture as being anti-innovation. Creative problem solving approaches have consistently been used to resolve issues. However, innovation has tended to be confined within the boundaries imposed by the nature of major public utilities and the narrow definition of its purpose delivering specific services reliably and within defined health and environmental permits and regulations.

What was to change the corporate culture was not a conscious effort to become 'more innovative' but a significant effort to change the way the organization viewed its purpose and scope of work and the principles that should be applied to determine what should be done and how. That began in earnest in 2001 with the launching of the Sustainable Region Initiative or, as it became widely known, the SRI.

The Sustainable Region Initiative

Beginning in 1997, to address concerns that had grown over time, wholesale changes were made to the budget and program planning process and the public engagement process, quickly followed by a major reorganization, including dismantling the three departments associated with particular utilities (water, sewerage and drainage, solid waste) and replacing them with new departments designed to bring integration to utilities' management.

These changes improved the capacity of the organization but did not provide the purpose or motivation to the staff to do so. Indeed, such changes are stressful on staff and require careful change management to enable the transition to survive.

However, in 2001, the Federation of Canadian Municipalities hosted its first sustainability and cities conference, which turned out to be a transformational experience for the Metro Vancouver staff leadership. The conviction emerged that sustainability had to be made the cornerstone for everything the Metro Vancouver organization attempted to do and that this was worth staking a career on. This in turn was transformed into a fundamental motivating power for staff by a process that extended over several years and continues today.

That story is unfortunately too long to relate here and there were many bumps in the road. But the four key elements which ultimately made it successful were:

1. **Relate the change to the basic values and aspirations of staff:** virtually all public servants want to improve their communities, but it was important that both policy oriented and more operations oriented staff could see themselves as valuable contributors
2. **Make it practical from the get-go:** while conventional planning processes begin with lengthy visioning and goal setting exercises, these fail to capture those eager to make practical changes and risks becoming the proverbial ‘dust collector’ plan
3. **Engage the staff in defining the implementation of the Initiative:** every staff member was encouraged to reflect on what sustainability meant for their specific job and to make suggestions for improvement. Education and training was extended throughout the organization – if the initiative is left to a specialist group chances are that is where it will stay. Success was celebrated, including any award we could get!
4. **Repeatedly demonstrate the top level commitment to the Initiative:** the commitment and passion of the CAO was conveyed in extensive contact with staff. Success stories and positive community feedback helped develop political champions.

A New Framework

The adoption of the Sustainability Framework in 2008 by the Metro Vancouver Board was a major landmark in the journey which started in 2001. The purpose was not framed as a desire to achieve technological innovation, or even innovation generally, for its own sake. It was framed in terms of the need to develop an understanding of and adopt a thoroughgoing sustainability perspective, and to implement whatever changes were necessary to achieve that end. It had to avoid being seen as a passing fancy, or as something arbitrarily imposed. The object was to embed deep in every staff member, elected official or community member, a motivation to contribute to whatever change was necessary to achieve a sustainable future for the community.

If the early stages of the SRI can be viewed as presenting the staff with an opportunity and encouragement to explore innovation, what the adoption of the framework in 2008 provided was not only a license to innovate but an imperative to do so.

Broadening the Goal Definition stimulated the search for new technologies

The three legged stool (economy, environment, social) of sustainability already partially existed in Metro Vancouver decision making. It complied with environmental permits and regulations. It strove to minimize costs. It was concerned with worker safety, knowledge and skills development and with sufficient community engagement to avoid community resistance to new projects or activities.

What the SRI brought was a heightened awareness of environmental, economic and social goals more related to broader societal goals than to the narrower performance goals of the utility. The principle of conserving and developing natural, economic and social capital led to new objectives: recapturing materials and energy from liquid and solid waste streams; addressing corporate contributions to climate

change; capitalizing on opportunities to partner with business and benefit the economy, particularly 'green' economy; engaging the community in ways that would increase people's sense of civic engagement and responsibility.

The Board set targets in most of these areas and staff was challenged to look for innovations, including technological innovations to achieve them. The goals of reliable and safe performance of the utilities would remain, but now other priorities would also demand solutions.

If the need and appetite for technological innovation were thus stimulated, the next challenge was to manage the process in a way that allowed exploration to flourish while not exposing the organization to reckless risk.

Managing the Technological Innovation Process

Technological innovation is initiated in three ways:

- a) The Purpose Driven Enquiry: this is by far the most common process. A particular issue is identified and is assigned to a particular group to address it, or several individuals or small groups may see the opportunity to address such an issue in their area of responsibility.
- b) Technology driven enquiry: this occurs when new technology is made available to staff and they explore its potential to achieve different objectives. This may not seem very purposive. However, the new technologies are always installed for some specific purpose and it is often in that context that other possibilities are discovered.
- c) External initiatives: private firms and academic institutions approach Metro Vancouver with ideas they suggest might meet a need we are facing, realize an opportunity we should be interested in, or are simply inherently intriguing.

While there are some differences in emphasis, the broad management process is broadly similar and has the objectives of:

- i. Encouraging the exploration of technological innovation and not prematurely cutting off investigations into new possibilities;
- ii. Ensuring that the final decision to proceed or not proceed is based on thorough business casing and risk assessments including assessments of the contribution to established corporate goals and fit with current operations; and
- iii. Ensuring sufficient communication occurs to guide the exploratory stage so that critical questions will be identified and addressed but not so much as to fetter or discourage initiative.

So research/analysis, small scale experiments and pilot studies are encouraged. 'Skunk-works' which proceed a considerable distance 'below the radar' echo the 'sustainability challenge' where every employee was encouraged to discover ways to advance the sustainability agenda in their personal work.

However, staff has increasingly seen the value of ‘checking in’ at various stages so that they can benefit from the questions raised and advice given by senior staff, with less fear of premature termination of the project.

At some point projects reach a ‘threshold’. This might involve requesting new resources, new technologies or defining a project to go out for proposals. Crossing this threshold involves a number of processes.

Metro Vancouver has developed business casing tools, including sustainability factors as appropriate, and each proposal has to be business cased. A scan will be made to determine what other possibilities should be considered related to the same goal. The relative priority of the proposed project relative to other competing uses of resources and time will be assessed. Where staff have little familiarity with a proposed technology, great lengths will be taken to verify its track record elsewhere, particularly if it is vendor initiated.

‘Failure’ is difficult to define precisely, but staff estimate that focussing the enquiry to begin with, together with an increasingly iterative check-in process, has resulted in more than half the projects which reach the threshold stage succeeding to the next stage. The due diligence and conservatism of that approval process has resulted in probably only 5% of approved projects not succeeding.

Some Illustrative Examples:

1. Purposive Driven Enquiries

a) SEE-GEN power project

This project arose from the search for opportunities to generate renewable energy from Metro Vancouver operations. The Waste-to-Energy facility generated steam, some of which, but not all, had been sold to adjacent industry. The proposal was to install a turbine and generate electricity for sale to B.C. Hydro.

The screening test showed it would have a positive social impact (four new jobs), a positive economic impact (\$5 – 6 million worth of new energy) and a positive environmental impact (the same power generated by the local gas fired power station would have produced 59,000 tonnes of greenhouse gases). Low-noise designs avoid disturbing adjacent wildlife and air-cooled condensers reduced the need for cooling water. The 17 megawatts of electricity produced is sufficient to power 15,000 homes and the next step is to use the residual heat from the turbo-generator as a heat source for nearby residential and industrial development.

This project received an Association of Professional Engineers and Geoscientists of British Columbia (APEGBC) Sustainability award, a BC Hydro PowerSmart Excellence Award, a Federation of Canadian Municipalities Sustainable Communities Award, and the Canadian Institute of Energy Award.

The staff named it SEE-GEN, SEE being the acronym for ‘social, economic and environmental’, reflecting the staff’s recognition of the new sustainability paradigm.

b) Cloverdale SSO storage facility

This project arose from the search to apply sustainability principles to a sanitary sewer overflow problem. A unique storage system was designed to automatically divert overflows to a 6700 cubic metre tank which stored the flow until the storm had passed then returned it to the regular collection system. Energy efficient and 'green' features included:

- the use of gravity for most drainage,
- an innovative flushing system using a small amount of retained wastewater to avoid pumping fresh water for tank cleaning,
- automated controls to allow centralized monitoring and control,
- use of natural and wetland grasses for landscaping, reducing surface run off,
- re-use of excavated soils to reduce the need for imported fill,
- use of "Ecosmart" (fly ash) concrete to reduce CO₂ emissions from concrete manufacturing, and
- providing a utility road to resolve local farmland access problem.

This project also won an APEGBC sustainability award.

2. Technology Driven Projects

Annacis/Iona Co-generation project

New computerized data acquisition and control (CDAC) technology enabled wastewater treatment plant staff to explore new operational procedures. Some digester gas was being recycled to fuel boilers and co-digestion engines for electricity. However, much was still flared and, faced with high energy bills, staff used CDAC to develop new computer logic to optimize and balance gas feeds to the boilers and co-gens. The system allowed the process to be incrementally 'tweaked' until dramatic results were obtained. Electricity imports were reduced by 43%, saving \$560,000 annually. Natural gas consumption of 4,300 m³ was eliminated, saving \$360,000 annually. Wasted (flared) digester gas was reduced by 73% saving \$600,000 annually. These \$1,520,000 annual financial benefits plus the environmental benefits associated with reduced external energy use and reduced greenhouse gases, and the social benefits of the pride of a self starting workforce earned this project the Federation of Canadian Municipalities Sustainability Community Award.

3. External Initiatives

Struvite recovery project

Struvite (phosphorous) precipitates in liquid waste stream pipes, is difficult to remove, causing loss of capacity and the eventual need for pipe replacement. Staff discussed with University of British Columbia (UBC) professors who took an interest from the perspective of recovering phosphorous in response to worldwide declines in the supply of this irreplaceable and critical-to-life element. ('Peak phosphorous' is anticipated in around 2035). UBC led the design and development of a system to capture struvite from the liquid waste stream and convert it to a valuable fertilizer ('Crystal Green'). This project has won

many awards including the prestigious Synergy Award for Innovation from Canada's Natural Science and Engineering Research Council.

Interestingly, the project then failed to pass the threshold to go into commercial scale operation possibly because the business case conservatively calculated benefits to Metro Vancouver. Given the soaring price of phosphorous and the possibility of new regulations requiring its recovery, this business case is being revisited.

For more examples and to examine the Sustainability Framework, see the Metro Vancouver website at www.metrovancouver.org and click *Sustainable Region Initiative* under 'About Us'.

Disruption of existing operations from such projects has become an increasing concern, yet their value is clearly recognized. Consequently the Metro Vancouver Board approved the pursuit of the 'Academy concept' and with financial assistance from the Provincial and Federal governments the first such academy to accommodate research and education in wastewater (particularly 'sludge') is being built on the site of the Annacis Wastewater treatment plant and will become operational later in 2011.

Conclusion

The nature of major utilities justifies a conservative risk management approach to ensure reliability and avoid public health and environmental disasters. However, the adoption of broader sustainability goals at Metro Vancouver has stimulated the search for innovative technological solutions and a two step management process has enabled award winning technological innovation to proceed with minimal failure rates.

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