Issue 184 Feb 6, 2006

The Magnificent Seven

Last October, I spent three days in Canada in the company of Leo Gohier and teams of enthusiastic asset managers in Hamilton, Toronto and the University of Waterloo. Back to back asset management discussions for three days may not be everyone's cup of tea, but read "The Magnificent Seven" on pages 22-23 and you will get a flavour of the fun of those meetings—and you will understand why I am pleased that Leo has accepted my invitation to join the SAM Contributors' Panel.

During our Canadian meetings, I was able to spend several hours with the innovative and enthusiastic asset management team at the City of Hamilton, which Leo headed up before his (semi-) retirement . On the back page, 24 is an example of one of the ways in which they get their message across - "Making the point– Graphically!"

Ype Wijnia and Joost Warners complete their three-part story on their use of portfolio planning—and they conclude that

> "*Asset management might not be such a strange business after all.* We have seen that we do influence the performance of the network, even though we only touch a small part of the asset base and the policy portfolio.
>
> *However, the influence is more in preventing deterioration than in improving the performance*. If nothing else, the portfolio approach at least made that visible.
>
> Fortunately, this was not the only benefit. ...The engineers experienced a better opportunity to get their vital projects through the decision making process, whereas the budget holder felt much more assured about the right level of the budget. "

See why on pp 19-21

Enjoy!

Penny Burns

Researched and written by Dr Penny Burns, AMQ International,. unless otherwise specified, Published fortnightly. Subscription, Comment, or Inquiries to

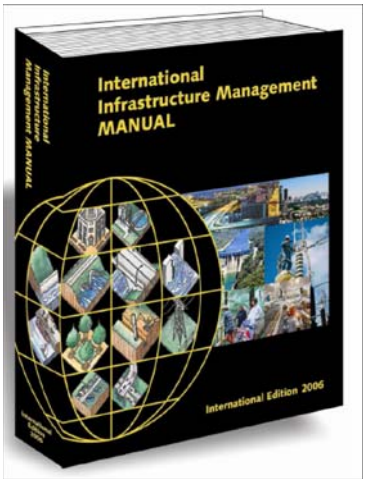
More information on the new, updated IIMM 2006

Last issue we announced the arrival of IIAM 2006

The IIAM is a joint product between Australia and New Zealand.

If you are Australian the quickest way to assure your copy of the latest, updated, information is to go to

www.ipwea.org.au



In fact, if you are an Engineer *and* Australian *and* interested in asset management, and you are NOT a member of the IPWEA, WHY NOT?

The IPWEA has the best chat site for practical problem solving in asset management of anything that I have seen in their members' "Ask Your Mates" service. Consider just these topics that have been the subject of lively debate over the past few months: footpath management, condition assessment, valuation, asset management standards, amongst others.

Plus they have the best AM Courses. Do yourself and your community a favour and join.

Meanwhile, back at Essent Netwerk

In Issue 182 Ype Wijnia and Joost Warners introduced two highly important ideas for asset managers, risk governance and system inertia.

> Whilst risk management is the valuation of technical opportunities and the province of the asset manager, they argue that *risk governance is the valuation of the problem itself* – how important is it to the organization in the overall scheme of things?
>
> Systems inertia took this idea forward by noting that while assets have long life cycles, the technology behind them is even longer. *What changes more quickly is the institutional environment within which the assets operate and provide service*.

From this they developed their key strategic question – How do we manage rapid response to institutional requirements? They introduced their "Portfolio Planning Approach"

In Issue183, they spelt out how they generated a greater variety of projects to give themselves a genuine choice.

In this final part of their paper, they cover the issue of ranking projects under this approach in "Making the decision" and – what I find especially valuable for emulation – they evaluate their own approach, not with an eye to justification, but with an eye to continuous improvement.

Now read on.

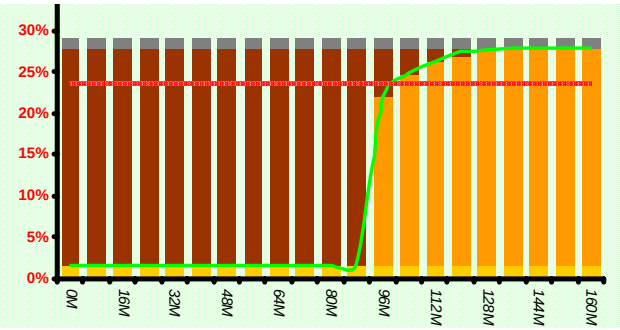
Portfolio Planning, Part 3:

YPE WIJNIA & JOOST WARNERS

Making the portfolio decision

To prepare the decision the engineering staff had been gathering investment opportunities during the whole of 2003.

The staff was split into 3 sub teams, one for Gas, one for High voltage and one for Medium and Low voltage. Part of the opportunities were based on a legal requirement and therefore compulsory. All teams ranked the non-compulsory opportunities concerning their area of attention. Part of this ranking was based on asset performance models to calculate the effects on the business values. The rest of the opportunities were ranked by the teams directly. The total volume of potential expenditure was about 140 million euro, divided over about 600 projects. Of this number, about 90 million was fixed in the portfolio, either because of the mandatory nature or because it was selected directly by the experts. The rest was ranked by the yield. This can be seen in the graph below, as for the first 90 million euro of budget no effect on the business values is seen. After about 140 million of expenditure the performance does not change anymore, indicating that all projects were executed



The red, horizontal line towards the top of the graph indicates the weighted performance level of 2002. This means that the "only compulsory expenditure" strategy would result in a 23% deterioration of the performance. Spending about 100 million would keep the performance at the 2002 level, although it could mean a different distribution over the key performance indicators. The maximum achievable performance would be a 7% increase, with an associated expenditure of about 140 million.

The green line that runs horizontally towards the bottom of the graph and then curves sharply upwards indicates the theoretical maximum for the budget based on the branch and bound algorithm, the orange (light) columns to the right show the maximum for the first order heuristic. There almost no difference between them, which can be explained by the distribution of project size. If one large project would not fit within the budget, it would be replaced by a large number of small projects with about the same yield, almost completely filling the gap.

A critical part for the approach was the selection of the combined portfolio.

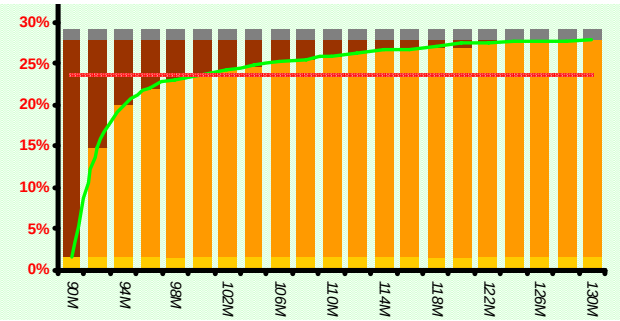
As the teams worked independently, the yields of their project could be nonaligned because of differences in the modeling approach. This might result in the selection of all projects from one team and none of the other. Such a result would not be accepted. Therefore special attention was paid to the process of selection.

What to do when the modelling throws up results that are unacceptable to certain sections?

Essent Netwerk decided to make it a group decision and planned a full day for this. In preparation for the day all team results were combined into one list, and a preliminary ranking was produced. This ranking was discussed in the group. In this first round the value of the day became clear. The Gas team found that a major part of their projects, that they considered as vital for the reliability of the grid, was not in the final result. The other teams agreed on the importance of the projects. This deficiency was created by the valuation of the reliability of both the gas and the

electricity grid on the same KPI, whereas the electricity net had a CAIDI of 25 minutes and the gas net of about 3 seconds. Adding a new KPI for the reliability of the gas grid would solve the problem. It should be noted that for more than 95% of the portfolio no discussions arose.

After this initial round to check for consistency a few rounds followed to set a budget proposal.



The budget was set at 100 million euro, and the teams checked if all their top priority projects were selected. If the team could accept the omission, that would be the final result, otherwise the budget would be increased, and the check process would be repeated. At a budget level of 120 million every team was satisfied. This proposal was sent to head office for approval, accompanied with the budget graph shown to the left.
The proposal was almost completely accepted.

Risk Governance

Head office did not question the ranking, (The Risk Management issue): however, they did not feel the need for such a performance increase, and would be satisfied by the performance reached by a 118 million euro budget. This was sent back to the teams, to allow for a few minor changes, and the selected projects were implemented.

Evaluation of the portfolio approach

In an evaluation of the approach most participants said they liked the portfolio decision very much, because they felt they were in control all the time.

> Especially the show flexibility with KPI´s and the possibility to hand-select perceived vital projects was found convincing. In addition, the option to relate the effects of budget, projects and preferences to the performance of the whole network was valued highly. It became very clear that although asset managers cannot improve the performance of the network very fast, they can do a lot to prevent it from deteriorating. Asset management is a business after all.

However, a few concerns remained.

The problems we encountered and the methods we have currently adopted to address them

The first concern was the expected sensitivity to data errors, produced by the rough estimates in the Asset Performance Models. To address this concern a sensitivity analysis was performed, which showed that the portfolio was almost 100% robust. Even random errors of about 20% in the data did not influence the portfolio performance, and only a few projects would change in selection status. This was explained by the very large spread in the yield of the projects (about 3 orders of magnitude) against the 20% error. That left us with the possibility of systematic errors, but those would not affect the ranking, only the total performance.

The next concern questioned the accuracy of the decision. In the decision we assumed all effects would happen in the next year. However, some of the projects in the portfolio would require several years for completion. The costs of those

projects would be spread over the years, but the benefit would only be delivered in the final year. If we would include such a project in the portfolio, we would not use the full budget, nor reach the predicted performance. However, only including the effects for the next year would result in only costs and no benefits, meaning the project would never be selected. As some long term projects clearly had more value than some short term opportunities, we think our assumption resulted in the best decision and accepted the inaccuracy, but the dilemma remains.

We all agreed that the portfolio decision worked fine for projects within the discretion of the company, **but some projects required consent from other parties.** This created two risks

A third concern addressed the comparability of the projects. . If we selected a project that would not be accepted by external parties, the project would not be feasible, requiring a new decision. However, If we would get the consent before the portfolio decision and not select the project, we would loose credibility to those other parties. We resolved this dilemma by fixing or unfixing those kind of projects, but we think it is not the real optimum.

Finally, some of the projects were mutually exclusive. For example, a bottleneck in the high voltage grid can be solved by reinforcing the grid in two separate places due to the topology of the network. However, implementing both solutions does not solve the problem twice. In practice this interdependency occurs only for a few of the projects, so we handled this problem by selecting one of the options manually and comparing the resulting portfolios. This would become quite a challenge if the level of interdependency or the number of projects increased. Therefore, it would be helpful if the interdependency could be indicated in the project properties section.

Answers—And More Questions

Asset management might not be such a strange business after all. We have seen that we do influence the performance of the network, even though we only touch a small part of the asset base and the policy portfolio. However, the influence is more in preventing deterioration than in improving the performance. If nothing else, the portfolio approach at least made that visible. Fortunately, this was not the only benefit.

Acceptance!

"The engineers experienced a better opportunity to get their vital projects through the decision making process, **whereas the budget holder felt much more assured** about the right level of the budget."

The portfolio approach was also a successful attempt to shorten the decision making cycle. Even though it required more preparation time, this was recovered in the acceptance of the proposed portfolio. The engineers experienced a better opportunity to get their vital projects through the decision making process, whereas the budget holder felt much more assured about the right level of the budget. Even the final budget cuts were accepted by the engineers, because it was very clear the budget holder was willing to bear the extra risk. Finally, the decision proved to be very robust, despite earlier criticism.

But issues remain!

(Ed: Asset management must always be "a work in progress"

However, a few concerns are left. In the first place, some projects could be completed within the upcoming year, complete with all the costs and the performance improvement. Others would take years of construction time, and only a part of the costs and none of the performance improvement would be realized. This meant the portfolio outcome was not an adequate predictor of future performance. A second issue concerned the comparability of the projects. Some were clearly within the discretion of the company, but others required consent of other parties. Part of the projects therefore risked being not feasible, requiring a new portfolio decision. Finally, some projects were mutually exclusive. In the current process this was handled manually, but it would be helpful if this could be indicated in the project properties section.

Questions welcome !

IN 1960, a movie called The *Magnificent Seven* hit the big screens and was an immediate success. This western tells the story of seven gunfighters hired by a Mexican village to protect them from banditos who come every now and then to take whatever crops the town has grown since their last visit. When the banditos come again the villagers, with the help of the seven hired guns, successfully fight them off.

The analogy here would be that infrastructure issues are the banditos while asset managers are the gunfighters required to deal with the increasingly aggressive deterioration of under-funded assets and the services they provide.

The National Guide to Sustainable Municipal Infrastructure

The National Guide to Sustainable Municipal Infrastructure has now issued more than 50 "best practices" to assist municipalities in dealing with an ever-increasing number of infrastructure issues. One of those best practices is entitled "Municipal Infrastructure Asset Management", and it includes a well-regarded process that I will affectionately refer to as the Magnificent Seven.

The Magnificent Seven is a series of seven questions that, when answered either at a high level or in great detail, can assist municipalities in developing sound and sustainable asset management policies and programs. These seven questions are as follows:

1. What do you have and where is it? (inventory);
2. What is it worth? (costs, replacement rates);
3. What is its condition and expected remaining service life? (conditions and capability analysis);
4. What is the level of service expectation and what needs to be done? (capital and operating plans);
5. When do you need to do it to? (capital and operating plans);
6. How much will it cost and what is the acceptable level of risk? (capital and operating plans); and,
7. How do you ensure long-term affordability? (short- and long term financial plans).

Is an asset still required?

As a result of a visit to Canada a few months ago from Dr. Penny Burns, a renowned international specialist on infrastructure matters from Australia, it became evident that one key question was not being asked: Is an asset still required? This is a critical question, and more often than not it is not even considered as an option. The reason for this is quite simple: municipal managers generally consider that their primary function is to manage assets within the confines of existing staff (human resources) and money (budgets).

A Focus on Community Service

The primary function of municipal managers is to provide a service requested by the community.

Should the community decide that they do not wish to have a given service any longer, there is no need for the asset . Such a mindset would certainly allow for a different approach to asset management since the primary focus would now be on the service and not on the asset. That being the case, it would automatically follow that once a service is selected there is a need to define the level of service and to design, build, operate and maintain the assets required to deliver that level of service for as long as that service is required..

How do you maintain sustainability?

The City of Hamilton has suggested that this should be the final question in this thought process ,

This also brings up the issue of affordability in question seven. Affordability is not the solution, since it's really not a question of affordability but a question of sustainability. Prioritization of expenditures is also not a solution, since it only deals with the short-term funding deficit and not the long-term funding that is required for a sustainable service. Basically, if you cannot afford a service, then that service is eventually doomed to failure because it's simply not sustainable.

We therefore need to rethink asset management objectives in terms of the service required and not the asset itself. When the focus is strictly on the asset and not on the service, then we maintain assets for the sake of maintaining assets, which in fact simply perpetuates the status quo. The status quo may not be affordable any longer, and the community should have a say in whether or not they wish to maintain the status quo and, if so, whether they are willing to pay for it

Redefining AM Objectives

Asset management objectives then need to be rewritten as follows:

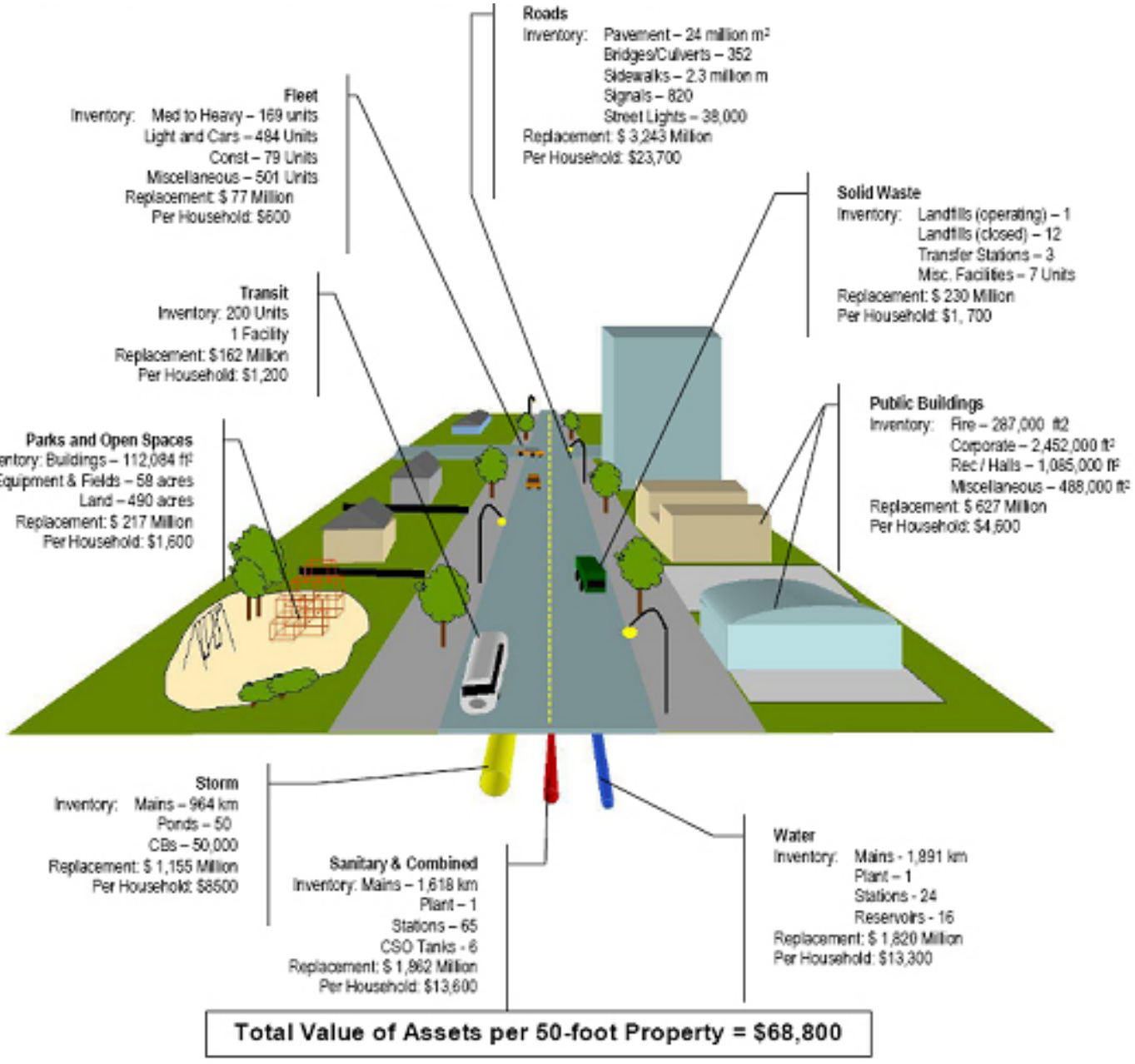
1. Lowest cost infrastructure? A: Not necessarily.
2. Lowest cost of services? A: Not necessarily.
3. Sustainable services? A: Yes.And that means services. . .
    a. at a desired level,
    b. at an affordable level,
    c. at a prescribed level; and,
    d. at a possible level.

In conclusion, it is paramount to ask "Do we need it?" very early on in the process. This then sets up a parallel thought process in terms of level of service and! or eventual dismantling of an asset for a service that is no longer required or desired by the community. This in turn would promote much-needed dialogue with the community on infrastructure issues to allow it to make informed decisions.

Leo Gohier has both a Civil Engineering degree and qualifications in public management. He has 30 years experience, mostly at Ottawa and Hamilton City councils in Canada.

So the next time Yul Brynner and the boys ride into town, perhaps what they ought to ask the good citizens is, "Are you sure you want gunslingers and are you sure you can afford all seven of us? Is a huge shootem-up really going to solve the problem in the long term, or are we going to be back here in a couple of years to shoot The Return of the Seven? Perhaps the level of service you want could be better provided if you were to call, say, your Godfather and have Marlon Brando quietly make those persistent banditos an offer they can't refuse." ■

Asset Values per Household



In the figure above, Hamilton City distributes its $9 billion public assets over its 137,000 urban properties or single family homes on a typical 16 metre lot in the city. (City of Hamilton, 2005 Life-Cycle State of the Infrastructure Report on Public Works Assets, page 9.) at http://www.myhamilton.ca/ Have a look at the full report for even more interesting ideas for making the point graphically.

Recurrent Costs?

What about a schematic to illustrate where O&M goes? Add on AAAC (Average Annual Asset Consumption), which is Total Replacement Value/ Economic Life. Don't use Renewal Expenditure in this equation. Depreciation is acceptable if assets are valued at TRV and depreciation lives are an accurate reflection of reality.