Mike Levery believes the basic current approach to Asset Management fails to recognise the crucial relationship between operational maintenance and capital investment on maintenance. How should maintenance be dealt with as part of a successful asset management model?

ARE WE GOING THE WRONG WAY?

Different asset management philosophies and models were developed in the 1990s. But the basic approach to their application has been the same in different market sectors. This approach may provide a long-term focus for managing assets. However, it often fails to recognise the crucial relationship between capital investment associated with maintenance on the one hand, and operational maintenance costs on the other. What is the relationship between operating costs and capital investment that maximises financial benefits whilst optimising asset performance?

MANAGEMENT MODELS

Outsourcing of maintenance grew significantly in the 1990s. Facilities management and construction companies started to take on asset maintenance contracts. At the same time asset management developed as a philosophy for the client organisations, particularly those managing infrastructure assets. For the first time in many organisations, the subject of maintenance became a boardroom topic. The attractiveness of delivering immediate financial benefits through outsourcing maintenance now needed to be matched by an understanding of how assets perform.

Asset Management models help clarify the roles and responsibilities associated with firstly owning, secondly investing in, and thirdly operating and maintaining assets.

A typical hierarchical asset management model is shown in Figure 1 on the facing page. This model sets out the four core roles that have responsibility for the assets, and the relationships between them.

The **ASSET OWNER** is responsible for securing the operational expenditure requirements (OPEX) and both capital maintenance and strategic investment requirements (CAPEX) so that the Asset Manager can deliver the long-term performance required by the Asset Owner. Capital maintenance includes large repairs outside the scope of operational expenditure and minor improvement work.

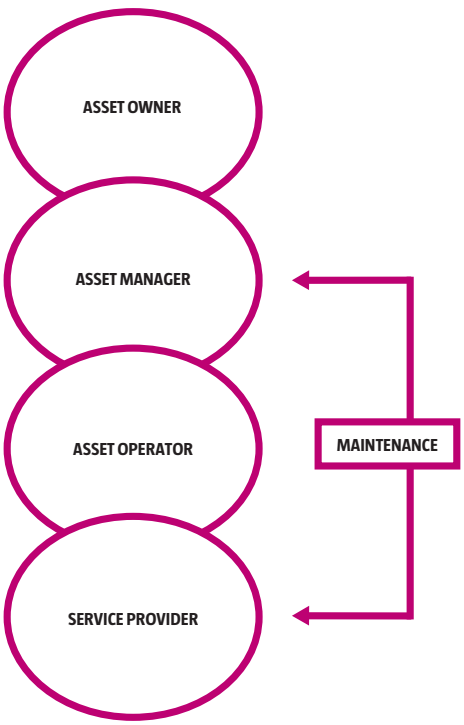
The **ASSET MANAGER** must set the necessary operational performance criteria so that the Asset Operator has performance objectives and targets within the OPEX allocation. The Asset Manager is also responsible for delivering the necessary CAPEX investment to meet the long term performance objectives.

The **ASSET OPERATOR** must organise his resources to meet the operational performance

objectives and targets. These will apply both to the Operator's activities and to work carried out on the assets delivered by Service Providers.

The **SERVICE PROVIDER** delivers services to the Asset Operator through vehicles such as service level agreements (SLAs) or other forms of contractual arrangements.

FIGURE 1. ASSET MANAGEMENT – THE FOUR-TIER MODEL



MAINTENANCE AND ASSET MANAGEMENT

When organisations try to fit the maintenance activity into the Asset Management Model, they are usually determining whether it should be performed by the Asset Operator or by a Service Provider. There is a general failure to recognise that the maintenance activity is also a fundamental element of the Asset Manager's responsibility and therefore bridges three of the core elements of the Four-Tier Model, namely: Asset Manager, Asset Operator and Service Provider. Inevitably the following questions then arise:

- Who is accountable for maintenance? Is it the Asset Manager or the Asset Operator?
- Who should hold the maintenance budget?
- Who should manage Capital Maintenance?

Many organisations fail to grasp these questions. Instead they treat maintenance simply as an OPEX activity delivered as a service to the Asset Operator. The critical part played by Capital Maintenance in improving asset performance throughout the predicted life of the asset is thereby overlooked or ignored.

In some operations it is wholly appropriate that maintenance is a pure service provision. Where the risk for asset performance sits wholly with the Asset Operator, it is the operator's responsibility to determine the maintenance regime. Typically, these arrangements are appropriate where the quality of operation of the asset is crucial to asset performance and longevity. Elsewhere, the assets are effectively passive; there is no direct operational input that affects the performance of assets. Asset performance is wholly dependant on how well the assets are maintained both with operational expenditure and capital maintenance funding.

Take the railways as an example: is the performance of the infrastructure assets down to how well they are operated or how well they are maintained? Most of the railway infrastructure – including the network's bridges and structures, the rail itself including the points, and the signalling systems – is effectively passive. Operational decision-making has little influence on the performance of the assets. How well the network is maintained is the main determinant of performance.

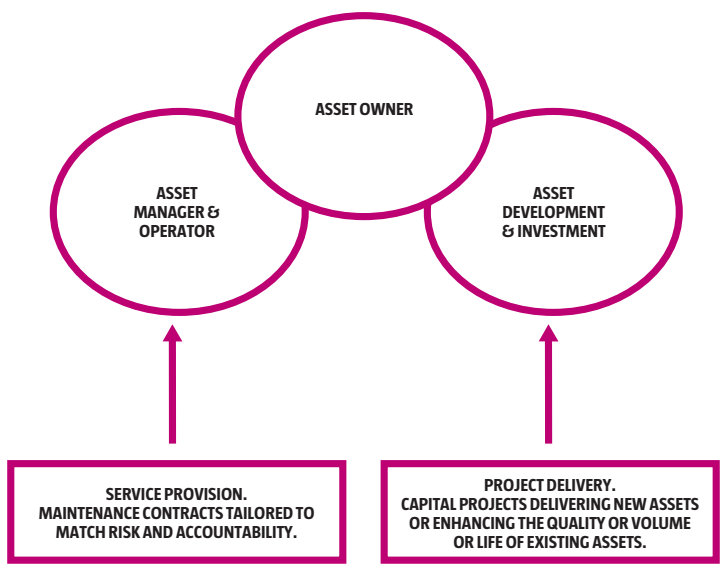
REMODELLING ASSET MANAGEMENT

The Four-Tier Asset Management Model fails to represent maintenance and presents a picture of the Asset Manager as the custodian of the assets. Those responsible for running the assets are merely depicted as the Asset Operators, usually with ongoing short term operational performance objectives and targets to meet. These operational targets are often in conflict with maintenance needs, and generally give the operator little or no interest in the long term resilience of the assets and their overall performance.

How often, no matter what sector of industry you may work in, do production/operations show an active interest in the long-term benefits of planned preventative maintenance? There still is, in many sectors, an "if it ain't broke don't fix it" mentality borne of a drive to maximise productive output. The Four-Tier Asset Management Model reinforces the thinking of the Asset Operator to continue operation without regard to the consequences of failure, as ownership of maintenance is not their responsibility.

The only way to get the production/operations function to start taking ownership of the long-term performance of the assets is to remove the Asset Manager role and

FIGURE 2. ASSET MANAGEMENT – THE INFRASTRUCTURE MANAGEMENT MODEL



integrate it into the production/operations function. Production/operations then have full responsibility not just for the ongoing performance of the assets but for the whole life performance. No longer should they be judged simply on performance and financial targets associated with OPEX; they must now take a longer term view matching performance criteria with Capital Maintenance investment. This approach ensures that proactive initiatives such as planned preventative maintenance are taken on board by production/operations functions to deliver longer term operational performance and cost benefits.

The asset management model must now be redesigned to reflect this changing role. There is no longer a requirement for a separate role of Asset Operator. In effect, the production/operations function is taking on the role of the Asset Manager and so becomes the custodian of the assets throughout their predicted life. Further, they are responsible for managing all externally delivered activities – usually those related to maintenance – that impact on the assets. Their service provision arrangements must reflect the risk and accountability that the Service Providers impart when working on the assets.

The remainder of the Asset Manager's responsibility; namely the development of existing assets beyond their predicted life, together with new investment, forms a separate function reporting to the Asset Owner. Asset Development and Investment focuses on delivery of capital projects, whether for infrastructure enhancement or renewal, or new build. The result is the Infrastructure Management Model as shown in Figure 2 on previous page.

FINANCIAL APPROACH TO MAINTENANCE

The financial distinction between OPEX and CAPEX has driven how organisations structure themselves as well as how they present their accounts. Investment is viewed as financing new requirements and not as a vital requirement for cost-effective operation of existing assets. Therefore, although maintenance has a foot in both camps, it is usually placed in the "OPEX" part of the organisation. The result? – the CAPEX element of maintenance gets neglected. CAPEX, however, however has a major impact on long-term OPEX – a point which tends to be overlooked by financial functions.

The need to drive down OPEX continuously, to deliver "efficiencies" causes many organisations to bend their investment rules so as to appear to achieve their OPEX objectives. I have found that in a number of infrastructure organisations a significant and growing proportion of CAPEX is in reality the capitalisation of unpredicted, costly failures. What is really OPEX appears in the accounts as CAPEX. In some market sectors, and particularly in regulated businesses, there is a drive to maximise potential CAPEX in order to create sufficient resources to cope with unpredicted operating failure.

IT IS NO LONGER APPROPRIATE TO SQUEEZE OPEX AND EXPECT CAPEX TO BAIL OUT WHEN THERE ARE CRISES

I have worked with a number of organisations which are struggling to deliver their predicted capital programme because of pressures on the CAPEX budget arising from unpredicted failures. It is now clear to me that a much more strategic approach needs to be taken to the financial management of existing assets. It is no longer appropriate to squeeze the OPEX funds to meet short-term shareholder expectations and expect CAPEX to bail out when there are crises.

I propose the following as key features of an improved Infrastructure Management approach:

▲ Those responsible for managing the assets on a day to day basis should also be responsible for the long term resilience of the assets within their predicted life.

▲ Appropriate funding must be provided in order that **CAPEX** is targeted for maintenance investment purposes. Planned and strategic shut down of plant to carry out refurbishment is a **CAPEX** activity and not routine **OPEX**.

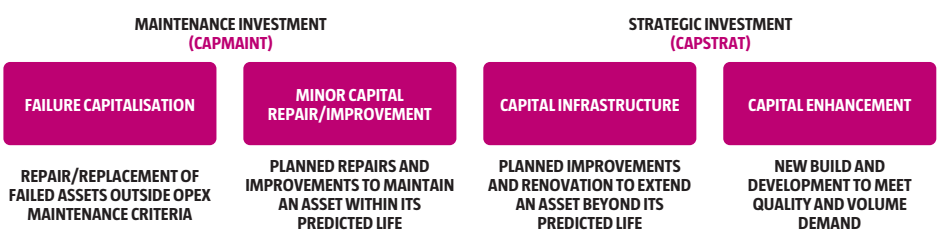
▲ **CAPEX** should be separated out into capital maintenance (**CAPMAINT**) and strategic investment (**CAPSTRAT**), with **CAPMAINT** being managed and controlled by the production/operations function alongside their **OPEX** budget. The key components of **CAPMAINT** and **CAPSTRAT** are shown in Figure 3.

Further explanation follows using the water industry's water supply and sewerage networks as examples:-

CAPMAINT is made up of two key elements

▲ Failure capitalisation involving the repair/replacement of failed assets falling outside

FIGURE 3. ALLOCATING CAPEX FUNDING



the OPEX maintenance criteria. These are generally unpredictable failures requiring significant expenditure that has not been budgeted for. A capital block allocation is made to cover for such eventualities usually based on historical experience. Typical CAPMAINT expenditure would involve repairs to a burst strategic water main or repairing a collapsed trunk sewer. The cost of such repairs would usually be a five figure sum.

▲ Minor capital repair/improvement involving repair/replacement of failing assets outside the OPEX maintenance criteria. Planned preventative maintenance is the key source for identifying this form of investment together with the necessary routine refurbishments associated with planned shut down activities. Typical minor capital expenditure would involve replacing a section of water main prone to excessive leakage, or a section of sewer which frequently blocks due to a partial collapse. Again the cost of repairs would be in the order of a five figure sum.

CAPSTRAT is also made up of two key elements

▲ Capital infrastructure involving planned investment to extend existing assets beyond their predicted life. The water industry spends significant sums on rehabilitation of its water supply and sewerage networks. This includes major relining or replacement – for example of trunk water mains, trunk sewers, water supply zones, or sewer catchment networks. Capital infrastructure projects are generally of the order of six figure sums, with some projects running into the millions.

▲ Capital enhancement involving new development to achieve quality and/or volume demands. The first ten years of water privatisation saw significant investment in improved water treatment processes to achieve high quality standards in the supply of potable water. Sewage treatment facilities were upgraded where they existed and new facilities built, particularly on coastal outfalls to meet EU bathing water standards. The majority of these schemes were multi-million pound civil and mechanical/electrical projects.

Any planned expenditure of **CAPMAINT** should demonstrate through cost benefit analysis the impact on the **OPEX** budget as a result of this investment, with the necessary adjustments to **OPEX** for future years. In this way reductions in future **OPEX** are carried out in a structured way rather than being driven by fixed financial objectives. This naturally leads to a focus on asset performance, planned investment to resolve issues and reduced **OPEX** as an outcome.

THE FUTURE

Asset Management has made its first tentative steps into promoting the needs of the assets as the foundations underpinning an organisation's business model, but has made mistakes in applying generic business models in all situations.

There is, in my view, a case for developing a specific business model for infrastructure management organisations whether they be rail, water, gas or electricity. The drivers and principles are similar. There has to be a shift from the **OPEX/CAPEX MENTALITY** to

(OPEX + CAPMAINT)/CAPSTRAT and the development of the Infrastructure Management Business Model which will deliver a much more robust and long-term solution to the operation and maintenance of physical assets.

Can the financial systems cope with such a change? If financial markets can provide investment funding for "not for profit" mutual organisations then Plcs should be able to determine shareholder returns based on a mixed **OPEX** and **CAPMAINT** approach to running their infrastructure assets. ▲

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AM: HOW TO GET THERE

At the Stewardship Forum on May 11 – PAS 55 Launch Day – Robin Steel of LUL described to members of the IAM where he believes the London Underground PPP should be heading, and asked for everyone's experiences of how to get there.

In association with Tube Lines, Metronet BCV and Metronet SSL, Robin's team have commissioned a first pass on good world practice on how to turn into a first class Asset Management organisation. Not just what is best practice in doing Asset Management – covered in the International Infrastructure Management Manual and the new standard PAS 55 – but the paths to get there. They are asking for the Institute of Asset Management membership to help develop this, validating it against successful and not so successful attempts across sectors.

The 'Good Asset Management Organisation' model is based on some familiar UK examples, but also on input from a wide range of asset organisations in Australia, focused in particular on a day workshop at ICOMS 2004. (See elsewhere in this issue for more on the PAS 55 Launch and ICOMS 2004.) From the workshop in Sydney emerged six key factors in successful implementation:

▲ Asset Management leadership with sense of urgency

▲ Integrated whole life decision making using knowledge from across the organisation and its supply chain, and based on risk to function/ serviceability

▲ Good asset information management (not equivalent to IT alone)

▲ Integrated quality AM processes and systems, with appropriate roles with their right foci

▲ Shared explicit mental model of AM and interdependencies (including in service partners)

▲ Continuous programme of AM change initiatives over several – more than three – years

On behalf of LUL and its PPP partners, Assets magazine invites members to offer your perspective on these factors.

▲ How did your organisation go about improving in one or more areas of Asset management?

▲ What are the key lessons you learned?

▲ What were the most important top 1/2/3 things you did?

▲ What would you counsel another company to avoid?

Articles on case studies and approaches under any of these six headings are very welcome. There will also be an event hosted by the LU partners later this year to discuss this.

If you are interested in contributing your views, attending the event, or scoring your organisation against a matrix of proposed stages based on these factors please contact ruth.wallsgrove@sarras.co.uk

PAS 55 Parts 1 & 2 is available from orders@bsi-global.com or 020 8996 9001

The UK edition of the International Infrastructure Management Manual is available from the IAM office, iam@iam-uk.org or 0845 456 0565. It costs just £100 for members, £150 for non members.